Columbia University Bulletin

College of Pharmaceutical Sciences

1967-1968

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To Communicate with the College

ADDRESS INQUIRES TO: The Registrar, College of Pharmaceutical Sciences, 115 West 68th Street, New York, N.Y. 10023. Office hours: Monday through Friday 9 a.m. to 5 p.m.

TELEPHONE: (Area code 212) 877-1733

Accreditation

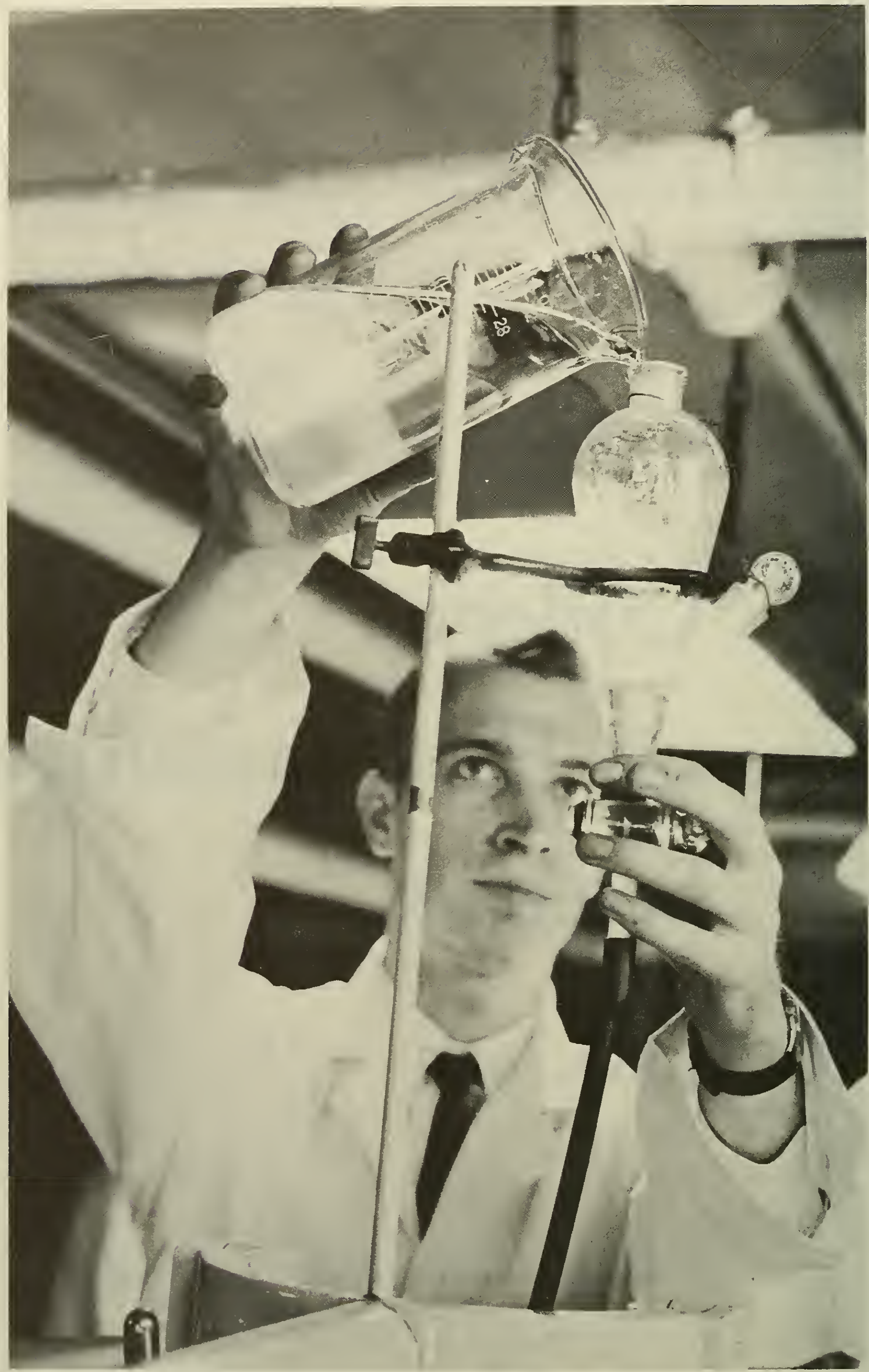
The College of Pharmaceutical Sciences is a member of the American Association of Colleges of Pharmacy and is accredited by the American Council on Pharmaceutical Education.

The College of Pharmaceutical Sciences reserves the right to make changes at any time in the curriculum, schedule, calendar, and regulations printed in this bulletin.

College of Pharmaceutical Sciences

1967-1968

Columbia University in the City of New York



LABORATORY EXPERIMENTATION DEVELOPS STUDENT INITIATIVE

Academic Calendar, 1967-1968

Note that Columbus Day, Veterans Day, Lincoln's Birthday, and Washington's Birthday are not University holidays.

For additional dates special to the Ph.D. program, see the Academic Calendar in the Graduate Faculties bulletin.

AUTUMN TERM

Sept 14–15	Thursday–Friday.* Registration for returning students in the B.S. degree program.
18	Monday.* Registration for returning students in the M.S. degree program.
19–20	Tuesday–Wednesday. Registration for Graduate Faculties students.
19–23	Tuesday–Saturday. Foreign Student Center orientation program for new foreign students (see page 39).
20	Wednesday, through September 26, Tuesday. Pre-session orientation program for first-year students. Registration for all new students.
28	Thursday. Term begins for all degree candidates. Morningside Campus classes begin. Last day to file *late* application for October degrees.
Oct 6	Friday. Last day to change programs.
25	Wednesday. Award of October degrees.
Nov 7	Tuesday. Election Day. NOT a College holiday.
15	Wednesday. Midterm date.
23–26	**Thursday–Sunday. Thanksgiving Holidays.**
Dec 1	Friday.† Last day to apply for February degrees (see January 25).
8	Friday. Last day to drop courses without penalty.
24	**Sunday, through January 7, Sunday. Christmas Holidays.**
Jan 22–23	Monday–Tuesday. Reading period; no classes held.
24	Wednesday, through January 30, Tuesday. Midyear examinations. Term ends.

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*Students allowed to register after the period specified must pay a late fee, and in the College of Pharmaceutical Sciences they must show satisfactory cause for the delay.

†Students who apply after this date must pay a late fee.

SPRING TERM

Jan	25	Thursday. Last day to file *late* applications for February degrees.
	26	Friday.* Registration in the M.S. degree program.
	31	Wednesday, through February 2, Friday.* Registration in the B.S. degree program.
Feb	1	Thursday. Last day to file essays for the M.S. degree to be awarded in February.
	2	Friday. Award of February B.S. degrees.
	5	Monday. Term begins for B.S. degree program.
	7	Wednesday. Term begins for M.S. degree program. Morningside Campus classes begin.
	16	Friday. Last day to change programs.
	22	Thursday. Award of February M.S. degrees.
Mar	1	Friday.† Last day to apply for June degrees (see May 1).
	29	Friday. Midterm date.
	31	**Sunday, through April 7, Sunday. Spring Holidays.**
Apr	12	Friday. Last day to drop courses without penalty.
May	1	Wednesday. Last day to file *late* applications for June degrees.
	13	Monday. Last day to file essays for the M.S. degree to be awarded in June.
	20–21	Monday–Tuesday. Reading period; no classes held.
	22	Wednesday, through May 29, Wednesday. Final examinations in the B.S. and M.S. degree programs. Term ends.

COMMENCEMENT

June	2	Sunday. Baccalaureate Service.
	4	**Tuesday. Conferral of degrees.**

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†Students who apply after this date must pay a late fee.

College of Pharmaceutical Sciences

The College of Pharmacy had its inception in a meeting of prominent pharmacists of the city on March 18, 1829, when a constitution was adopted, membership conditions established, and provision made for conducting lecture courses. It has been continuously active as a teaching institution since that time. The first lecturers were Dr. John Torrey, in physics and chemisty, and Dr. Stephen Brown, in materia medica. The College was granted a charter on April 25, 1831, and three students were awarded diplomas in that year.

For seventy-five years the College, as a completely independent institution, grew steadily in stature and continuously developed more than a local interest. In 1851 delegates from the three other colleges of pharmacy then in existence were invited to meet to consider the establishment of standards for drugs. A second meeting for the same purpose was held in Philadelphia in 1852. As a result of these meetings the American Pharmaceutical Association was established. Since 1904 the College of Pharmacy has been affiliated with Columbia University, and its educational program has reflected the benefits of the union in breadth and in character.

The undergraduate program in pharmacy, leading to the degree of Bachelor of Science conferred by Columbia Univesity, provides an appropriate balance of liberal arts, humanities, basic sciences, and professional courses. Electives permit the development of individual interests and talents as preparation for service in any of the many areas of pharmaceutical activity. The curriculum fulfills the requirements for admission to the state licensing examinations throughout the country.

Since 1897 the College has also provided opportunity for graduate study and research. The present graduate programs lead to the degrees of Master of Science and Doctor of Philosophy.

In 1966, by special action of the Board of Trustees, and with the authorization of the Board of Regents of the State Education Department of the State of New York, the name of the College was changed to the College of Pharmaceutical Sciences in the City of New York. This action was taken to convey more accurately the broader aspects of the educational programs and career opportunities in the pharmaceutical sciences provided by the modern curriculum of the College. The new title also signifies the new goals and objectives that the College seeks to achieve in the future.

The College works energetically to fulfill all three aspects of its obligation as an educational institution: through its library and archives, to conserve knowledge; through its teaching, to transmit knowledge; and, through the research of its faculty members, to extend the limits of knowledge.

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The Faculty of Pharmaceutical Sciences

Joseph L. Kanig, Ph. D. *Dean of the College of Pharmaceutical Sciences*

Samuel S. Liberman, M.A. *Associate Dean for Student Affairs*

Charles O. Beckmann. *Professor of Chemistry*
B.S., Brooklyn Polytechnic, 1924; M.A., Columbia, 1925; Ph.D., 1929

Lynne Belaief. *Assistant Professor of Philosophy*
B.A., Vassar, 1958; Ph.D., Columbia, 1963

Bernard P. Brennan. *Adjunct Professor of English*
B.S., Fordham, 1941; M.A., 1946; Ph.D., 1961

Lucy W. Clausen. *Assistant Professor of Microbiology*
B.S., Long Island, 1931; M.A., New York University, 1945; Ph.D., 1947

Robert M. Dell. *Adjunct Professor of English*
B.A., Franklin and Marshall, 1942; M.A., Columbia, 1947; Ph.D., New York University, 1960

Rene L. Farhi. *Associate Professor of Pharmaceutical Chemistry*
B.S., St. Joseph (Lebanon), 1939; M.S., (chemistry), Centre Etudes (Lebanon), 1944; M.S. (mathematics), 1957; Ph.D., St. Joseph, 1962

Alvin Felmeister. *Associate Professor of Pharmaceutics*
B.S., Rutgers, 1943; Ph.D.. 1963

Elmer L. Gaden, Jr. *Professor of Chemical Engineering*
B.S., Columbia, 1944; M.S., 1947; Ph.D., 1949

Suzanne A. Galton. *Assistant Professor of Chemistry*
B.S., Hunter, 1953; M.S., Polytechnic Institute of Brooklyn, 1960; Ph.D., 1963

Gilbert J. Hite. *Associate Professor of Pharmaceutical Chemistry*
B.S., New England College of Pharmacy, 1954; M.S., Wisconsin, 1957; Ph.D., 1959

Brian F. Hoffman. *Professor of Pharmacology*
B.A., Princeton, 1946; M.D., Long Island College of Medicine, 1949

George F. Horowitz. *Associate Professor of Pharmacy Administration*
B.S., College of the City of New York, 1933; LL.B., Columbia, 1938; M.B.A., 1954

Joseph L. Kanig. *Professor of Pharmaceutics*
B.S., Long Island, 1942; M.S., Columbia, 1949; Ph.D., New York University, 1960

Samuel S. Liberman. *Associate Professor of Chemistry*
Ph.G., College of Pharmacy, 1925; B.S., Columbia, 1927; M.A., New York University, 1933

Matthew Lipman. *Associate Professor of Philosophy*
B.S., Columbia, 1948; Ph.D., 1950

Spiro P. Loucas. *Assistant Professor of Pharmaceutical Chemistry*
B.S., Fordham, 1957; Ph.D., Rutgers, 1965

Edwin B. Matzke. *Professor of Botany*
B.A., Columbia, 1924; Ph.D., 1930

Philip C. Merker. *Professor of Pharmacology*
B.A., Brooklyn College, 1946; B.S., Long Island, 1951; M.S., Purdue, 1953; Ph.D., 1954

Frank J. Pokorny. *Associate Professor of Biology*
Ph.G., College of Pharmacy, 1925; Ph.Ch., Columbia, 1927; B.S., 1933; M.A., 1950

David Rittenberg. *Professor of Biochemistry*
B.A., College of the City of New York, 1929; Ph.D., Columbia, 1934

Margaret C. Staud. *Assistant Professor of Biology*
B.A., Columbia, 1940; M.A., Cornell, 1941

Abraham Taub. *Distinguished Service Professor of Pharmaceutical Chemistry*
Ph.G., College of Pharmacy, 1920; Ph.Ch., Columbia, 1921; B.S., 1922; M.A., 1927

Jack Venema. *Adjunct Associate Professor of English*
B.A., Lake Forest, 1940; M.A., New York University, 1952

Norman D. Weiner. *Assistant Professor of Pharmaceutics*
B.S., Long Island, 1959; Ph.D., Columbia, 1965

► OTHER OFFICERS OF INSTRUCTION

VISITING OFFICER OF INSTRUCTION

Alfred V. Willi. *Visiting Professor of Chemistry*
Ph.D., Zurich, 1949

INSTRUCTORS

Leonard Barmak, M.B.A. *(Pharmacy Administration)*
Lena DeLisser, M. S. *(Chemistry)*
Richard Staum, M.A. *(Mathematics)*
William Weinstein, B.S. *(Pharmaceutics)*

ASSOCIATE

Eugene Erlich, M.A. *(English)*

LECTURERS

Paul Bedoukian, Ph.D. *(Applied Pharmaceutical Sciences)*
John Facq, B.A. *(Applied Pharmaceutical Sciences)*
Richard Flink, LL.M. *(Industrial Administration)*
Thomas Grenfell, M.S. *(Applied Pharmaceutical Sciences)*

Herbert Heinrich, Ph.D. *(Applied Pharmaceutical Sciences)*
Merrill Hessel, Ph.D. *(Physics)*
Bernard Idson, Ph.D. *(Applied Pharmaceutical Sciences)*
Warren Jacobson, M.B.A. *(Industrial Administration)*
Marie Jones, M.A. *(Applied Pharmaceutical Sciences)*
John Kuemmerle, M.B.A. *(Industrial Administration)*
Philip Keusch, M.S. *(Pharmacy Administration)*
Martin Levin, M.A. *(English)*
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David Popofsky, M.S. *(Pharmacy Administration)*
Calvin Probst, B.S. *(Pharmacy Administration)*
Robert Schinnagel, B.S. *(Applied Pharmaceutical Sciences)*
Gilbert Simon, B.S. *(Hospital Pharmacy Administration)*
Joel Wittenberg, B.S. *(Pharmacy Administration)*
John Wright, M.B.A. *(Pharmacy Administration)*

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Joseph L. Kanig. *Pharmaceutics*

George F. Horowitz. *Pharmacy Administration*

Abraham Taub. *Pharmaceutical Chemistry*

Philip C. Merker. *Biological Sciences and Pharmacology*

Matthew Lipman. *General Education*

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Evelyn Fleischman. *Administrative Assistant to the Dean*

Stephen M. Gross, B.S. *Assistant to the Dean*

Alice V. Kaye, B.A. *Bursar*

Samuel S. Liberman, M.S. *Director of Admissions*

Monte P. Shepler, M.A. *Registrar*

Agnes Tiborcz, L.S. *Librarian*

OFFICERS EMERITI

Lewis N. Brown, Phar.D. *Professor Emeritus of Pharmacy*
Sag Harbor, New York

Fanchon Hart, M.A. *Professor Emeritus of Biology*
Yorktown Heights, New York

The Bachelor of Science Program

The undergraduate program is a five-year program leading to the degree of Bachelor of Science in pharmacy conferred by Columbia University. Candidates may either enroll in the College of Pharmaceutical Sciences for the entire program or, after completing up to two years of preprofessional studies elsewhere, enroll in the College for the remainder of their work.

To be awarded the degree, the candidate must meet the following requirements:

1. He must be of good moral character.
2. He must have completed at least one academic year of full-time study at this College.
3. He must have completed 170 points of course work in the curriculum established by the Faculty of the College or its equivalent.
4. He must have achieved a cumulative quality-point average of at least 2.0 for all course work completed during the time that the student is matriculated in the College.
5. He must have discharged all financial obligations to the College.

► ADMISSION REQUIREMENTS AND PROCEDURE

Both men and women are eligible for admission. An applicant must be in good health and must show evidence of good character. His secondary-school record must include at least 16 units of work completed in an approved four-year high school or the equivalent, thereby satisfying the requirements of the New York State Education Department for admission to the study of pharmacy. Although no specific program of secondary education is required, the following preparation is recommended:

	Units
English literature and composition	4
American history and social studies	2
Ninth-year mathematics or elementary algebra	1
Tenth-year mathematics or plane geometry	1
Eleventh-year mathematics or intermediate algebra	½–1
Foreign language (one)	2
Chemistry	1
Academic electives	4–4½
	15½–16½

It is desirable for the applicant to include, as electives, additional courses in science (biology, physics) and in mathematics (trigonometry, advanced algebra).

A candidate whose preparation differs from that suggested above should consult the Office of Admissions of the College of Pharmaceutical Sciences for advice regarding his eligibility for admission.

ADMISSION PROCEDURE

Requests for information and for application forms should be addressed to the Office of Admissions, College of Pharmaceutical Sciences, Columbia University, 115 West 68th Street, New York, N.Y. 10023. The completed application, including the information to be supplied by the secondary school, may be submitted after the completion of six terms of secondary school studies.

All candidates are required to participate in the morning Scholastic Aptitude Test which is administered by the College Entrance Examination Board. For information about this test and for the application form, the candidate should write to the College Entrance Examination Board, Box 592, Princeton, N.J. 08540. The identification number assigned to the College of Pharmaceutical Sciences is 2103.

Each candidate must also file a medical and physical examination form completed by his personal physician.

An applicant who is accepted for admission must pay a commitment fee of $50. This fee is credited to tuition if the applicant registers for the term to which he has been admitted; it is not refundable if the applicant withdraws.

Applicants are cordially invited to visit the College of Pharmaceutical Sciences for a conference with the Director of Admissions. Appointments may be made in advance by letter or by telephoning (area code 212) 877–1736.

ADVANCED PLACEMENT

Qualified students may be granted college credit for course work completed under the auspices of the Advanced Placement Program.

For advanced placement and credit in any subject, an entering student must have demonstrated proficiency in a college-level course completed in secondary school and in the Advanced Placement Examination administered by the College Entrance Examination Board.

Course credit may also be granted if an entering student has completed, with an acceptable score, a New York State College Proficiency Examination in a subject corresponding to a course in the curriculum of the College. When the course in question involves laboratory work, the student may be required to complete, with an acceptable grade, a laboratory examination administered by the appropriate division of the College.

ADVANCED STANDING

Advanced standing may be granted to an applicant who has completed course work in an accredited college or university. Candidates for admission with advanced standing should have satisfied all requirements for admission to the Bachelor of Science program and should file an advanced standing application form. The academic credentials to be submitted include an official transcript of secondary school studies, an official transcript of the college record, and a certificate of honorable dismissal, or one indicating that the candidate is entitled to honorable dismissal, from each college attended. Each document must be sent directly from the Registrar's Office of the school which the candidate has attended to the Office of Admissions of the College of Pharmaceutical Sciences, Columbia University. A marked catalogue showing courses completed in the college or university should be submitted for purposes of evaluation. No credit may be given for any course in which a grade lower than C (or its equivalent) has been earned.

Special requirements for admission to the second preprofessional year: A candidate who has completed at least 30 points (semester hours) of course work in an accredited college or university may be admitted with advanced standing to the second preprofessional year, provided courses in general chemistry, qualitative analysis, and college mathematics (including a first course in calculus) are included.

Special requirements for admission to the professional program: An applicant who has completed at least 64 points (semester hours) of course work in an accredited college or university may be admitted to the first year of the professional program (the third year of the five-year program), provided he has completed the following courses (or their equivalents) with acceptable grades:

General chemistry and qualitative analysis
Biology (botany-zoology)
Mathematics
Organic chemistry
General physics
English literature and composition

The balance of the 64 points (semester hours) required should be taken in additional work in the subjects named above and in the social sciences, in a foreign language, and in literature and the fine arts.

ADMISSION BASED ON FOREIGN STUDY

An applicant whose academic preparation was completed in schools outside of the United States of America must have received approval of his educational experience from the New York State Education Department before consideration can be given to the application. The admission procedure is as follows:

1. Collect original scholastic credentials and have photocopies prepared, in duplicate.
2. Have certified translations made of these credentials (if in a language other than English). These should be in duplicate.
3. Arrange to have Form F-PH completed in its *entirety* and in duplicate.
4. File the completed Form F-PH, original scholastic credentials, certified translations, photocopies of credentials, and any other pertinent documents with the Office of Admissions, College of Pharmaceutical Sciences, Columbia University, 115 West 68th Street, New York, N.Y. 10023.

If the mails are used, please send documents by *registered mail.*

► THE CURRICULUM

FIRST YEAR		*Class Hours*	*Lab Hours*	*Points*
Chemistry 9–10	General chemistry and qualitative analysis	4	4	10
English 11–12	English	3		6
Humanities 12	Introduction to fine arts	3		3
Mathematics 17	Elementary functions	5		4
Mathematics 18	Calculus, I	5		4
Philosophy 11	Introduction to philosophy	3		3
SECOND YEAR				
Botany 23	Botany	2	4	4
Chemistry 27–28	Organic chemistry	3	4	10
Contemporary Civilization 21	Contemporary civilization A	3		3
General Education 22	Behavioral sciences, I	3		3
Physics 21–22	General physics	3	2	8
Zoology 24	Zoology	3	3	4
THIRD YEAR				
Biochemistry 32	Biochemistry	3	3	4
Chemistry 37	Quantitative inorganic analysis	3	4	5
Chemistry 38	Pharmaceutical analysis	2	4	4
Economics 31	Principles of economics	3		3
Pharmacy 32	Introduction to pharmacy	2		2
Pharmacy 33	Physical pharmacy, I	3		3
Pharmacy 34	Physical Pharmacy, II	3	4	5
Pharmacy Administration 32	Accounting principles	2	1	2
Physiology 39	Mammalian physiology	4	3	5
FOURTH YEAR				
English 41	Effective communication	3		3
Microbiology 43	Microbiology	3	4	5
Pharmacognosy 48	Pharmacognosy	3	3	4
Pharmacy 40	Public health	2		1
Pharmacy 45	Dispensing pharmacy, I	3	3	4
Pharmacy 46	Dispensing pharmacy, II	3	4	5
Pharmacy Administration 41	Principles of marketing	3		3
Pharmacy Administration 42	Pharmaceutical jurisprudence	3		3
Philosophy 42	Principles of logic	3		3
	Electives			0–8

FIFTH YEAR		*Class Hours*	*Lab Hours*	*Points*
General Education 51	Behavioral sciences, II	3		3
General Education 52	Behavioral sciences, III	3		3
Pharmacology 57	Pharmacology, I	4		4
Pharmacology 58	Pharmacology, II	3	3	4
Pharmacy 51	Dispensing pharmacy, III	2	3	3
Pharmacy 55–56	Pharmacy and chemistry of medicinals	3		6
Pharmacy Administration 54	Community pharmacy management	2	2	3
	Electives			0–14

► COURSES OF INSTRUCTION

HOW COURSES ARE NUMBERED

Odd numbers signify autumn-term courses.

Even numbers signify spring-term courses.

Two hyphenated numbers, one odd and the other even, signify a course that runs through both terms. The first half is prerequisite to the second half unless the course description says otherwise.

POINTS OF COURSE CREDIT

The number of points of credit a course carries *each term* is given in boldface type on the right margin of the course entry.

The University reserves the right to withdraw or modify the courses of instruction or to change the instructors at any time.

FIRST YEAR

Chemistry 9–10. General chemistry and qualitative analysis. **5 pts**

3 hours lecture, 4 hours laboratory, and 1 hour conference. Professor Loucas and assistants.

The fundamental concepts and theories of modern chemistry, including the principles of inorganic qualitative analysis.

English 11–12. English. **3 pts.**

3 hours lecture. Mr. Levin.

Rhetoric and usage; analysis of literary forms; selected readings in British and American literature.

Humanities 12. Introduction to fine arts. **Spring. 3 pts.**

3 hours lecture. Professor Lipman

A presentation of major works among the plastic arts—painting, sculpture, and architecture—with the aim of encouraging appreciation and understanding.

Mathematics 17. Elementary functions. **Autumn. 4 pts.**

4 hours lecture, 1 hour conference. Mr. Staum.

A review of algebra, and an introduction to trigonometric, exponential, and logarithmic functions.

Mathematics 18. Calculus, I. **Spring. 4 pts.**

4 hours lecture, 1 hour conference. Mr. Staum.

Prerequisite: *Mathematics 17.*

Differential calculus, including differentiation of composite functions and of trigonometric, exponential, and logarithmic functions; with applications in rates of change, approximations, maxima and minima, and graphing. Integral calculus, including elementary integration; with applications in areas, volumes, arc lengths, moments, pressure, and work.

Philosophy 11. Introduction to philosophy. **Autumn. 3 pts.**

3 hours lecture. Professor Lipman.

Fundamental problems in social and ethical philosophy, with class discussion based upon the arguments developed by classical and contemporary philosophers.

SECOND YEAR

Botany 23. Botany. **Autumn. 4 pts.**

2 hours lecture, 4 hours laboratory. Professor Pokorny and assistants.

The morphology, histology, cytology, genetics, and certain physiological processes of the higher plants. The evolutionary development of plant life, shown through a study of the different phyla.

Chemistry 27–28. Organic chemistry. **5 pts.**

3 hours lecture, 4 hours laboratory. Professor Galton and assistants.

Prerequisite: *Chemistry 10.*

A comprehensive course in elementary organic chemistry, based on modern theoretical principles. Synthesis and reactions of the different classes of organic compounds in the aliphatic and aromatic series, including applications to medicinal compounds.

Contemporary Civilization 21. Contemporary civilization A. **Autumn. 3 pts.**

3 hours lecture. Professor Belaief.

The main streams of thought and action which have contributed to the development of Western civilization. Readings of original works which have been and are of social or cultural importance, including those of Aristotle, Aquinas, Luther, Galileo, and Rousseau.

General Education 22. Behavioral sciences, I. **Spring. 3 pts**

3 hours lecture. Professor Belaief.

Our present-day society as viewed and appraised by the social sciences, with emphasis on the impact of technology and industrialization, the distribution of economic powers, the relationships between society and the individual, and kinds of social organization and disorganization. Readings include selections from Freud, Dewey, Gandhi, Galbraith, Riesman, and others.

Physics 21–22. General physics. **4 pts.**

2 hours lecture, 2 hours laboratory, and 1 hour conference. Mr. Hessel and assistants.

Prerequisite: *Mathematics 18* or the equivalent.

An introductory course on the results, methods, and spirit of the science.

Zoology 24. Zoology. **Spring. 4 pts.**

3 hours lecture, 3 hours laboratory. Professor Staud and assistants.

A survey of the animal kingdom, including the taxonomy, morphology, physiology, development, and evolution of representative species of the major phyla, with special emphasis on the vertebrates. In the laboratory, representative forms are studied by means of microscopic and macroscopic observations, dissections, and demonstrations.

THIRD YEAR

Biochemistry 32. Biochemistry. **Spring. 4 pts.**

3 hours lecture, 3 hours laboratory. Professor Loucas, Miss DeLisser, and assistants.

Prerequisite: *Chemistry 28, Chemistry 37, Zoology 24,* or their equivalents.
An introduction to certain aspects of enzymes and the intermediary metabolism of carbohydrates, lipids, proteins, and nucleic acids.

Chemistry 37. Quantitative inorganic analysis. **Autumn. 5 pts.**

3 hours lecture, 4 hours laboratory. Professor Liberman, Miss DeLisser, and assistants.

Prerequisite: *Chemistry 10, Mathematics 18, Physics 22,* or their equivalents.
The theory and chemical calculations of inorganic quantitative analysis. Laboratory work: the important volumetric and gravimetric methods.

Chemistry 38. Pharmaceutical analysis. **Spring. 4 pts.**

2 hours lecture, 4 hours laboratory. Professor Taub, Miss DeLisser, and assistants.

Prerequisite: *Chemistry 28* and *Chemistry 37,* or their equivalents.
Basic procedures for the qualitative and quantitative examination of organic medicinals and pharmaceutical preparations.

Economics 31. Principles of economics. **Autumn. 3 pts.**

3 hours lecture. Professor Horowitz.

An introduction to economic analysis; functions of the price system, national income, money and banking, economic fluctuations and fiscal policy, supply and demand, competition and monopoly, the development of modern economic systems.

Pharmacy 32. Introduction to pharmacy. **Spring. 2 pts.**

2 hours lecture. Pharmacy Division staff.

The professional principles which are basic to the sciences of pharmacy, including elements of pharmaceutical calculations.

Pharmacy 33–34. Physical pharmacy, I and II. ***33:* 3 pts. *34:* 5 pts.**

33: 3 hours lecture. *34:* 3 hours lecture, 4 hours laboratory. Professor Weiner and assistants.

Prerequisite: *Chemistry 28* and *Physics 22,* or their equivalents.
Fundamental physicochemical principles applicable to pharmaceutical systems. Emphasis is on thermodynamics, chemical kinetics, phase equilibria, solubility, interfacial phenomena, disperse systems, and other topics basic to an understanding of pharmaceutical formulations and drug activity.

Pharmacy Administration 32. Accounting principles. **Spring. 2 pts.**

2 hours lecture, 1 hour conference. Professor Horowitz.

An introduction to the basic theory of recording and reporting financial transactions, with emphasis on the evaluation and utilization of financial data for managerial purposes.

Physiology 39. Mammalian physiology. **Autumn. 5 pts.**

3 hours lecture, 3 hours laboratory, and 1 hour conference. Professor Staud and assistants.

Prerequisite: *Zoology 24* or the equivalent.
The physical and chemical processes, as well as nervous and humoral factors, that are responsible for integrative functioning of normal living mammalian cells, tissues, organs, and organ systems. Laboratory experiments and observations are concerned with fundamental physiological processes.

FOURTH YEAR

English 41. Effective communication. **Autumn. 3 pts.**

3 hours lecture. Professors Brennan, Dell, and Venema.

Prerequisite: *English 11–12* or the equivalent.

The elements of effective speaking: organization of ideas, enunciation, diction, poise, and technique, as applied to both conversation and formal speech. Criticism of talks prepared and delivered by students.

Microbiology 43. Microbiology. **Autumn. 5 pts.**

3 hours lecture, 4 hours laboratory. Professor Clausen and assistants.

Prerequisite: *Botany 23* and *Biochemistry 32,* or their equivalents.

General principles of microbiology, with special emphasis on the physiology of pathogenic microorganisms. Symptomatology; prophylaxis; epidemiology of the causative agents of bacterial, rickettsial, and viral infections; and laboratory methods for identification of the organisms involved. Laboratory exercises on standard methods for identification of microbial organisms, the examination of water and milk, and the testing of disinfectants and antibiotics.

Pharmacognosy 48. Pharmacognosy. **Spring. 4 pts.**

3 hours lecture, 3 hours laboratory. Professor Pokorny and assistants.

Prerequisite: *Botany 23* and *Chemistry 28,* or their equivalents.

Biochemical constituents of the official and certain nonofficial drugs of plant and animal origin, including plant hormones, antibiotics, allergens, insecticides, and related topics. Laboratory work: the microchemistry and microscopy of certain selected drugs, including the application of the techniques of micrometry, chromatography, and polarized light.

Pharmacy 40. Public health. **Spring. 1 pt.**

2 hours conference. Professor Clausen.

Prerequisite: *Physiology 39* and *Microbiology 43,* or their equivalents.

Aspects of public health applicable to the pharmacist as a health consultant. Participation in health agency programs.

Pharmacy 45–46. Dispensing pharmacy, I and II. ***45:* 4 pts. *46:* 5 pts.**

45: 3 hours lecture, 3 hours laboratory. *46:* 3 hours lecture, 4 hours laboratory. Professor Weinstein and assistants.

Prerequisite: *Pharmacy 34.*

The application of physicochemical principles to manufacturing and compounding techniques. Introduction to extemporaneous formulating and prescription compounding. Comparison of the various dosage forms in which medication can be dispensed. Elements of pharmaceutical calculations and the Latin of current use.

Pharmacy Administration 41. Principles of marketing. **Autumn. 3 pts.**

3 hours lecture. Professor Horowitz.

Introduction to marketing management, using situations from the pharmaceutical industry. Factors affecting consumer demand and methods of satisfying it; market structure and channels; product policy, including selection and methods of buying; promotion policy, including location analysis, selling, and advertising; pricing policy, including a professional basis; governmental framework of regulation.

Pharmacy Administration 42. Pharmaceutical jurisprudence. **Spring. 3 pts.**

3 hours lecture. Professor Horowitz.

Introduction to nature and function of law and basic elements of American governmental system; detailed analysis of statutes, administrative regulations, common law rules, and codes of ethics which affect the practice of pharmacy.

Philosophy 42. Principles of logic. **Spring. 3 pts.**

3 hours lecture. Professor Lipman.

The development of the process of effective reasoning through analysis of the logical structure of language, and study of inductive methods in science.

FIFTH YEAR

General Education 51. Behavioral sciences, II. Autumn. 3 pts.

3 hours lecture. Professor Belaief.

Prerequisite: *General Education 22.*

The nature of the individual and his situation in the modern world. Materials drawn primarily from psychology, psychoanalysis, and psychiatry, and secondarily from relevant materials in related social sciences such as anthropology and sociology. Emphasis is on comparison and appraisal of the various leading theories of individuality.

General Education 52. Behavioral sciences, III. Spring. 3 pts.

3 hours lecture. Professor Lipman.

Prerequisite: *General Education 22.*

The structure of society. Alternative theories of the structure of society. Orientation is primarily sociological but includes relevant materials from social psychology, philosophy, and realted disciplines.

Pharmacology 57-58. Pharmacology, I and II. 4 pts.

57: 4 hours lecture. *58:* 3 hours lecture, 3 hours laboratory. Professor Merker and assistants.

Prerequisite: *Biochemistry 32* and *Physiology 39,* or their equivalents.

The effects of drugs and poisons on normal and diseased mammalian cells, tissues, and organs; the therapeutic uses of drugs in relation to the pathologic state or processes associated with disease. Laboratory exercises emphasize the principles of biological assay and drug testing.

Pharmacy 51. Dispensing pharmacy, III. Autumn. 3 pts.

2 hours lecture, 3 hours laboratory. Professor Felmeister and assistants.

Prerequisite: *Pharmacy 46.*

Modern dosage forms, including principles of cosmetic technology. Laboratory exercises with prescriptions requiring special compounding techniques and the correction of incompatibilities. Formulation and evaluation of medicinal and cosmetic products.

Pharmacy 55–56. Pharmacy and chemistry of medicinals. 3 pts.

3 hours lecture. Professor Hite.

Prerequisite: *Biochemistry 32, Physiology 39,* and *Pharmacy 46.*

A systematic study of the pharmacy and chemistry of organic pharmaceutical and medicinal substances, with attention to the biochemical and pharmacological aspects.

Pharmacy Administration 54. Community pharmacy management. Spring. 3 pts.

2 hours lecture, 2 hours laboratory. Mr. Barmak.

Procedures, techniques, and underlying concepts in planning, organizing, directing, and controlling a community pharmacy in the current environment.

ELECTIVE COURSES

Depending on his major interests, a student may select courses from the following to meet the requirements for graduation. A student interested in graduate study should take work in calculus, physical chemistry, and also in a foreign language.

Biochemistry 77. Elementary clinical analysis. Autumn. 3 pts.

3 hours lecture. Instructor to be announced.

Prerequisite: *Biochemistry 32, Physiology 39,* and *Chemistry 37.*

Routine tests as well as recent advances in clinical chemistry, with emphasis on pathologic alterations of tissues.

Chemistry 87. Pharmaceutical control methods. Autumn. 4 pts.

2 hours lecture, 4 hours laboratory. Professor Farhi.

Prerequisite: *Chemistry 38* or the equivalent.
Introduction to instrumentation including applications of the refractometer, potentiometer, fluorphotometer, spectrophotometer, and Geiger-Müller counter to the evaluation of natural drugs and other complex pharmaceuticals. The quality control system is discussed.

Chemistry 91–92. Elementary physical chemistry. **3 pts.**

3 hours lecture, 1 hour conference. Professor Farhi.

Prerequisite: *Mathematics 80.*
The physical description of chemical species and reactions. Introduction to modern theories. *91:* Chemical thermodynamics, kinetic theory and chemical kinetics, electrochemistry. *92:* Quantum mechanics, atomic and molecular structure, chemical statistics and applications, nuclear and photochemistry.

Chemistry 97–98. Projects in pharmaceutical chemistry. **2 or 3 pts.**

4 to 6 hours conference and laboratory. Staff.

Humanities 73. Political ideologies. **Autumn. 3 pts.**

3 hours lecture. Professor Lipman.

An introduction to the nature of ideology, and a comparison of the arguments for the major ideologies of the past century: conservatism, liberalism, socialism, and fascism.

Humanities 75. Contemporary Western literature. **Autumn. 3 pts.**

3 hours lecture. Professor Lipman.

Modern poetry and some of the major novelists, including Stendhal, Flaubert, Dostoyevski, and James.

Mathematics 79–80. Calculus, II and III. **4 pts.**

4 hours lecture. Mr. Staum.

Prerequisite: *Mathematics 18.*
Hyperbolic functions; techniques and applications of integration; parametric representation; polar coordinates; three-dimensional analytic geometry; vector analysis; partial derivatives; multiple integrals; power series and Taylor series.

Microbiology 54. Parasitology and mycology. **Spring. 3 pts.**

2 hours lecture, 3 hours laboratory. Professor Clausen and assistants.

Prerequisite: *Microbiology 43.*
The animal parasites and fungi which cause disease in man and animals. The biology, morphology, host relationships, and epidemiology of the etiological agents associated with parasitoses and mycoses.

Pharmacognosy 84. Advanced microscopic pharmacognosy. **Spring. 3 pts.**

2 hours lecture, 4 hours laboratory. Professor Pokorny.

A detailed study of the more significant plant drugs beyond that of the undergraduate course. Advanced micropharmacognostical techniques are utilized.

Pharmacognosy 93–94. Projects in pharmacognosy. **2 or 3 pts.**

4 to 6 hours conference and laboratory. Staff.

Pharmacology 95–96. Projects in pharmacology. **2 or 3 pts.**

4 to 6 hours conference and laboratory. Staff.

Pharmacy 73. Principles of industrial pharmaceutics, I. **Autumn. 4 pts.**

2 hours lecture, 4 hours laboratory. Professor Kanig and assistant.

Prerequisite: *Pharmacy 46.*
The principles underlying the unit operations employed in the pharmaceutical industry in the production of all types of dosage forms. Laboratory exercises conducted with pilot plant equipment in the Industrial Pharmacy Laboratory.

Pharmacy 74. Principles of industrial pharmaceutics, II. Spring. 4 pts.

2 hours lecture, 4 hours laboratory. Professor Kanig and assistant.

Prerequisite: *Pharmacy 73.*

The physical factors and equipment employed in pharmaceutical manufacturing operations are discussed and evaluated. The influences of the processes and equipment on the biological activity, quality, and stability of dosage forms are emphasized, both in theory and in practice through special projects.

Pharmacy 91–92. Projects in pharmaceutics. 2 or 3 pts.

4 to 6 hours conference and laboratory. Staff.

Pharmacy Administration 70. Statistical analysis. Spring. 3 pts.

3 hours lecture. Mr. Wittenberg.

An introduction to statistical inference, probability theory, and sampling theory, with stress on evaluation of data and reports.

Pharmacy Administration 72. Marketing and advertising procedures. Spring. 3 pts.

3 hours lecture. Messrs. Keusch and Popofsky.

Pharmaceutical industry marketing and advertising techniques and strategy. Topics include the marketing project team concept; promotional mix; market and advertising research; test marketing; concept testing; preparation of advertising campaigns utilizing such media as journals, direct mail, conventions, house organs, and closed circuit television. All material presented is based on actual case studies.

Pharmacy Administration 73. Sales management and promotion. Autumn. 3 pts.

3 hours lecture. Messrs. Probst and Wright.

Recommended preparation: *Pharmacy Administration 72.*

Sales and promotional activities of drug manufacturers to the health professions and of retail pharmacies to the public. Product and claims development for increased sales appeal. Organization and development of the manufacturer's sales force, selection and training of professional service representatives, the functions of the individual detailman. Retail pharmacy practices, including interprofessional relations, sales promotion, and salesmanship. All material presented is based on actual case studies.

Pharmacy Administration 75. Hospital pharmacy administration. Autumn. 3 pts.

2 hours lecture, 2 hours laboratory. Mr. Simon.

The organizational pattern of the hospital and the relationship of the pharmacy to the various departments. Policies and procedures in the organization and the administration of the hospital pharmacy. Effective communication with medical and other health professions.

Pharmacy Administration 84. Pharmaceutical economics. Spring. 3 pts.

3 hours lecture. Instructor to be announced.

Prerequisite: *Economics 31.*

A socioeconomic study of health care and the role of pharmacy. The supply and distribution of health resources, the extent and distribution of the need for health services, and the patterns of consumer spending for health services. Voluntary, cooperative, and governmental plans and organizations providing health service on a prepayment, insurance, or welfare basis. The socioeconomic role of the drug industry and the pharmacy profession.

Pharmacy Administration 86. Business law principles. Spring. 3 pts.

3 hours lecture. Professor Horowitz.

Law as a tool of administration; for avoidance of legal difficulties; as promotion of legislative and administrative objectives. Substantive law of torts, contracts, property, agency, partnership, corporation, and trade regulation.

Pharmacy Administration 87–88. Seminar in pharmacy administration. 3 pts.

3 hours conference. Professor Horowitz and staff.

Prerequisite: the instructor's permission.

Each student selects one of the following fields for intensive study of administrative practice and strategy: manufacturing, wholesaling, retailing, international operations, professional organizations, hospitals and other institutions. A term project and oral reports are required.

Philosophy 71. Principles of ethics. **Autumn. 3 pts.**

3 hours lecture. Professor Belaief.

Readings and discussion in the theory of moral conduct, directed toward inquiry into the foundations of our ethical values, in a secular perspective.

Philosophy 74. Philosophy of religion. **Spring. 3 pts.**

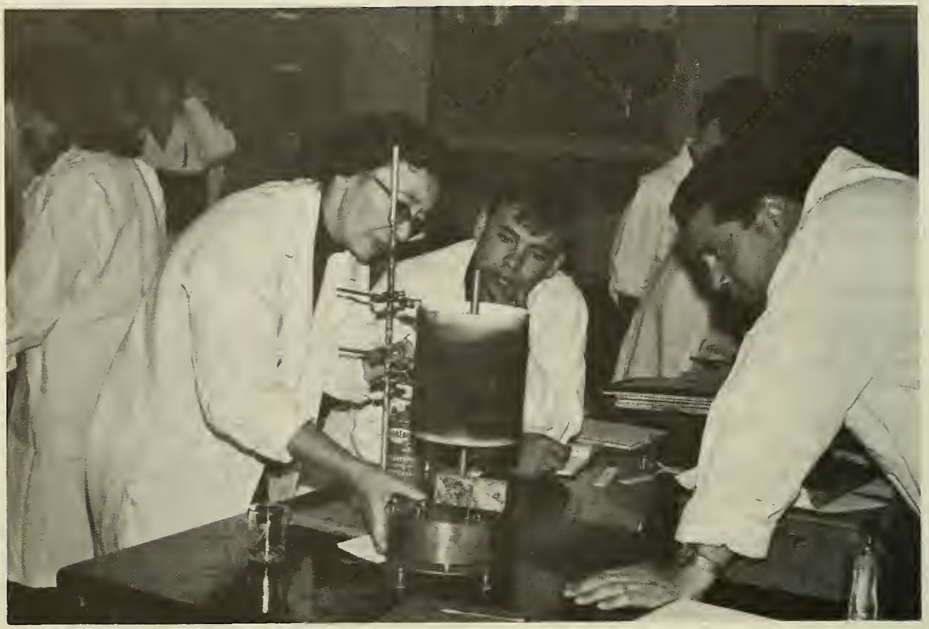
3 hours lecture. Professor Belaief.

The nature of religious experience through analysis of key concepts such as God, immortality, and evil. Readings in Augustine, Kierkegaard, Luther, Tillich, and Eliade.

Philosophy 82. Theories of knowledge and experience. **Spring. 3 pts.**

3 hours lecture. Professor Lipman.

Traditional and contemporary philosophical interpretations of the way we experience the external world, and how we extract knowledge of the world from that experience.



AN EXPERIMENT IN PHYSIOLOGY

STUDENTS CHECK REFERENCE MATERIALS IN THE LIBRARY

Graduate Study in the Pharmaceutical Sciences

Graduate study in the pharmaceutical sciences at Columbia leads to the degrees of Master of Science and Doctor of Philosophy. Requirements for the M.S. degree are set by the College of Pharmaceutical Sciences; those for the Ph.D. degree are administered by the Joint Committee on Graduate Instruction of the Graduate Faculties through its Subcommittee on Pharmacy.

Because research areas in the pharmaceutical sciences are diverse and are dependent upon basic physical and biological sciences, the graduate student is encouraged to obtain a sound background in physics, chemistry, and biology. Illustrative research problems include the design and synthesis of medicinal compounds; absorption, distribution, detoxication, and excretion of drugs; the relationships between the pharmacological activity of drugs and their chemical structures; the physicochemical properties of pharmaceutical systems; the development of methods of analysis of drugs in pharmaceutical systems; the action of drugs on the molecular level; the selective toxicity of antimicrobial agents; the isolation and elucidation of naturally occurring compounds having medicinal value; the factors influencing the stability of drugs; and the factors influencing the availability of drugs to the animal organism.

In planning a program of study, students may draw on a wide selection of graduate courses offered in other departments of the University.

PLACEMENT EXAMINATIONS

All graduate students are required to take placement examinations on the subject matter of undergraduate courses in general chemistry, organic chemistry, physiology, and mathematics through differential and integral calculus before they register for their first term of residence. The results are used in advising students on their programs of study. Opportunities are afforded the student to make up any deficiencies through assignment to appropriate course work. If, in the judgment of the Graduate Committee, the student's undergraduate background is incomplete, he may be required to complete more than the minimum number of points of course work prescribed for the degree. The examination dates may be obtained from the chairman.

COMMITTEE ON GRADUATE WORK

The Graduate Committee supervises the program of study and reviews the performance of all graduate students at regular intervals. The Graduate Committee will require a student to withdraw if his performance is deemed unsatisfactory.

▶ THE MASTER OF SCIENCE PROGRAM

The Master of Science program is designed for the student who desires to advance his knowledge of the pharmaceutical sciences and to develop professional competence in a given area. The student must show that he is able to undertake a limited research project. The M.S. degree is recommended but not required for completion of the Ph.D. degree.

Requirements for admission are as follows:

1. The applicant must hold a bachelor's degree from an institution approved by the College.
2. He must have a basic knowledge of pharmacy, pharmaceutical chemistry, physics, chemistry, and biology. He must have completed course work in mathematics through differential and integral calculus. If he does not meet all these requirements, he may be permitted to make up the deficiency while pursuing his graduate studies.
3. He must supply official transcripts of all previous college or university study and recommendations from former instructors testifying to his outstanding training and ability.

An applicant whose undergraduate studies were undertaken in a foreign country must supply complete certified translations of all his credentials. He must be proficient in writing, reading, and speaking English. If his native language is not English, he must take the English Language Placement Examination, which is administered by the American Language Program, Foreign Student Center, Columbia University. The examination will be given just before he enrolls for his first term in the College. He must also certify that he has sufficient funds to meet both living expenses and the expenses of graduate study.

ADMISSION PROCEDURE

Requests for application forms for admission to the Master of Science program should be addressed to the Office of Graduate Admissions, College of Pharmaceutical Sciences, Columbia University, 115 West 68th Street, New York, N.Y. 10023.

New students usually begin their graduate study in September. Applicants are urged to submit their complete applications and supporting documents before March 1 of the year in which study is to begin. Later applications are considered if space and facilities permit. New students are admitted in the spring term or in the College summer session only if facilities are available and suitable programs can be planned.

An applicant who is accepted for admission is required to furnish a $50 commitment fee, which will be applied toward tuition and other fees at the time of registration. This fee is not refundable if the applicant withdraws.

A student who accepts a graduate scholarship, fellowship, traineeship, or assistantship may accept a scholarship, fellowship, traineeship, or assistantship from another institution by submitting a written resignation of his first appointment by April 14. However, after April 14 a student must obtain a formal release from his first appointment before accepting a second one.

DEGREE REQUIREMENTS

A candidate for the degree of Master of Science is expected to demonstrate an advanced and mature knowledge of the pharmaceutical sciences, and he must meet the following requirements:

1. He must complete at least 30 points of graduate courses at Columbia University in not less than one year of resident study. If, in the judgment of the Graduate Committee, his undergraduate background is incomplete, he may be required to complete more than the minimum number of points of course work. The following courses are prescribed for all students: *Pharmaceutics 123—New drug evaluation; Chemistry G4147—Advanced organic chemistry; Chemistry G4091–G4092—Physical chemistry;* and a course in advanced biochemistry. An acceptable undergraduate course in physical chemistry may satisfy the requirement for *Chemistry G4091–G4092* but carries no point credit toward the degree. Any of these course requirements will be waived if, in the judgment of the Graduate Committee, equivalent work has been completed elsewhere or if the student has passed, to the satisfaction of the Graduate Committee, an examination without attending the course. The remainder of the student's program may be chosen from an approved list of elective courses offered by the Faculty of Pharmaceutical Sciences and other divisions of the University. The student's program is subject to the approval of the chairman of the Graduate Committee.
2. He must participate satisfactorily in the graduate seminars held during his residency.
3. He must submit an acceptable essay on a topic approved by the Graduate Committee.
4. He must pass the examinations required by the Graduate Committee.

► THE MASTER OF SCIENCE PROGRAM IN PHARMACEUTICAL ENGINEERING

This program is designed for students who have earned a bachelor's degree in pharmacy or in chemical engineering, and intend to do graduate work in industrial pharmaceutical science as preparation for research and developmental work in the new and expanding field of pharmaceutical engineering. These students specialize in industrial pharmaceutics and do research in pharmaceutical process design and improvement. The program of study is under the joint sponsorship of the Faculty of the College of Pharmaceutical Sciences and the Department of Chemical Engineering of the School of Engineering and Applied Science. For further information, students should consult Dean Joseph L. Kanig.

► THE DOCTOR OF PHILOSOPHY PROGRAM

The objectives of the Ph.D. degree program include the acquisition of an advanced knowledge of the fundamental principles of the pharmaceutical sciences and the ability to contribute to this fundamental knowledge through research.

A program of study leading to the degree of Doctor of Philosophy will usually require at least three years of full-time graduate work. A student's candidacy for the degree must be certified by the Dean of the Graduate Faculties of the University. Application for certification can be made only after the student meets both the general requirements for candidacy, as stated in the bulletin of the Graduate Faculties, and the following specific requirements:

1. He must pass qualifying examinations administered by the Joint Committee on Graduate Instruction of the Graduate Faculties through its Subcommittee on Pharmacy.
2. He must complete for examination credit at least 60 points of graduate courses, of which at least 30 must be taken at Columbia. Upon completion of the 60-point requirement, he must register continuously for the doctoral research instruction course until he has earned a total of 12 points (see the bulletin of the Graduate Faculties for details). The following courses are prescribed for all students: courses required for the Master of Science degree and, in addition, *Pharmaceutical Biology 225–226, Pharmaceutical Chemistry 208, Pharmaceutical Chemistry 111–112, and Chemistry G4133.* The balance of the program may include appropriate courses in the biological, physical, and pharmaceutical sciences under the Faculty of Pharmaceutical Sciences and other divisions of the University. The program must be approved in advance by the Adviser to Students.
3. He must participate satisfactorily in the graduate seminars held during his residency.
4. He must demonstrate his ability to read scientific literature in German and in either French or Russian.
5. He must pass a comprehensive certifying examination.

Thereafter, he must complete residence and research requirements, present his dissertation, and pass a final oral examination before a committee appointed by the Dean of the Graduate Faculties. In his dissertation the candidate must demonstrate that he has made a unique contribution to the knowledge within his field of specialization.

Further details of the admission and degree requirements are given in the bulletin of the Graduate Faculties. Students who have been admitted and who wish to obtain a detailed view of the sequences of tests, oral examinations, special options, and the like, should consult the subcommittee's section of the *Graduate Student's Guide.*

Requests for application forms for admission should be addressed to The Graduate Faculties Office of Admissions, 106 Low Memorial Library, Columbia University, New York, N.Y. 10027.

► COURSES OF INSTRUCTION AND RESEARCH

The following courses are conducted at the College of Pharmaceutical Sciences. For a key to the course listings, see page 14.

PHARMACEUTICAL BIOLOGY

Pharmaceutical Biology 121. Principles of biological assay. **Autumn. 3 pts.**

Lect: 1 hour to be arranged. Lab: 4 hours to be arranged. Instructor to be announced.

Prerequisite: pharmacology. Laboratory fee: $25.

The quantitative standardization of drugs by biological methods and the application of statistical methods of analysis to biological experimentation.

Pharmaceutical Biology 133. Advanced pharmacognosy. **Autumn. 3 pts.**

Lect: 2 hours to be arranged. Lab: 6 hours to be arranged. Professor Pokorny.

Prerequisite: elementary pharmacognosy and organic chemistry. Laboratory fee: $25.

This course carries credit only toward the M.S. degree.

Advanced macroscopic, microscopic, and microchemical techniques for the identification and evaluation of products of natural origin.

Pharmaceutical Biology 225–226. Modes of drug action. 3 pts. Professors Felmeister, Hite, Merker, and Weiner. Given in alternate years; not given in 1967–1968; to be given in 1968–1969.

Prerequisite: pharmacology, advanced biochemistry, and *Chemistry G4091.*

The relation of physical and chemical properties of drugs to their biologic action and a physicochemical treatment of the factors involved in biological response. Topics include relation of molecular constitution and molecular properties of structurally specific drugs to their biologic activity, the physical properties of structurally nonspecific compounds, interaction between drugs and enzyme systems, physical effects which modify the degree of drug action, absorption of molecules and ions through membranes and transport in body fluids, detoxication, drug resistance, synergism, and potentiation.

Pharmaceutical Biology 230. Biosynthesis of natural products. **Spring. 3 pts.**

Three hours to be arranged. Instructor to be announced.

Prerequisite: advanced biochemistry.

The metabolic pathways in the biosynthesis in plants of various compounds of medicinal importance, including alkaloids, terpenes, glycosides, and others. The application of radioisotopic tracers, precursors, feeding experiments, and other techniques.

Pharmaceutical Biology. 303–304. Special problems. **1 to 3 pts.**

Hours to be arranged. The staff.

Laboratory fee: $25.

PHARMACEUTICAL CHEMISTRY

Pharmaceutical Chemistry 101. Radioisotopes in the pharmaceutical sciences.
Autumn. 3 pts.

Lect: 2 hours to be arranged. Lab: 3 hours to be arranged. Professor Taub.

Laboratory fee: $60.

An introduction to the properties of radioisotopes and the characteristics of radiation. Production and standardization of radioisotopes, detection and measurement of radiation, radiation dosimetry and shielding, precautions in the handling of radioisotopes, and preparation of radioisotope-labeled compounds. Radioisotopes used in medicine, sterilization with radiation and radioisotopes, and the application of radioactive tracers to research problems. Laboratory experiments include methods of radiation detection, utilizing Geiger-Müller, proportional gas flow, and scintillation counters; the preparation of samples for measurement; gamma-ray spectrometry; determination of isotope distribution in living tissue; isotope dilution methods; and the application of radioisotopes to pharmaceutical research.

Pharmaceutical Chemistry 111–112. Instrumental methods of analysis. **6 pts.**

Lect: 1 hour to be arranged. Lab: 6 hours to be arranged. Professor Farhi.

Prerequisite: quantitative analysis, organic chemistry, and *Chemistry G4091–G4092.* Laboratory fee: $25 each term.

Advanced methods of physicochemical analysis, including electrometric, opticometric, and chromatographic analysis. Laboratory experiments in the development of analytical procedures for simple and complex pharmaceutical preparations.

Pharmaceutical Chemistry 208. Kinetics in homogeneous systems. 2 pts. Professor Willi. Given in alternate years; not given in 1967–1968; to be given in 1968–1969.
Prerequisite: *Chemistry G4091–G4092* or the equivalent.
Rates and orders of reactions in homogeneous systems; the collision theory and theory of absolute reaction rates; detailed analysis of catalysis involved in pharmaceutical systems; experimental methods; influence of temperature, light, solvent, ionic strength, and dielectric constant on reaction rates; accelerated stability analysis; oxidative and hydrolytic degradation of drugs and drug stabilization.

Pharmaceutical Chemistry 223–224. Advanced medicinal chemistry. 2 pts.

2 hours lecture. Professor Hite.

Given in alternate years; not given in 1968–1969.
Prerequisite: *Chemistry G4147.*
Structures, properties, syntheses, and reactions of selected naturally occurring and related medicinal compounds, with emphasis on the methods of structure elucidation. The application of physical methods—including optical rotation; ultraviolet; visible, and infrared absorption spectra; dipole moments; and dissociation constants—to structure determination. The establishment of the stereochemistry of certain compounds by conformational analysis and other methods. The assignment of pharmacophoric groups.

Pharmaceutical Chemistry 303–304. Special problems. 1 to 3 pts.

Hours to be arranged. The staff.

Laboratory fee: $25.

PHARMACEUTICS

Pharmaceutics 109–110. Principles of industrial pharmaceutics. 4 pts.

Lect: 2 hours to be arranged. Lab: 4 hours to be arranged. Professor Kanig and assistants.

Laboratory fee: $40 each term.
Theoretical and experimental analysis of problems associated with principles and methods of formulating and developing medicinal dosage forms. Emphasis is on laboratory work in the application of recent advances to problems on the industrial pharmaceutical level.

Pharmaceutics 113–114. Biopharmaceutics. 2 pts.

2 hours lecture. Instructor to be announced.

Given in alternate years; not given in 1968–1969.
Prerequisite: *Chemistry G4091* or the equivalent.
The biophysicochemical factors which influence the kinetics of drug absorption, distribution, metabolism, and excretion, and the role of the dosage form and its component parts in the absorption process. Current *in vitro* and *in vivo* methods of dosage form evaluation, in relation to the biological availability of active ingredients. The design of dosage forms, their physical stability and biological availability.

Pharmaceutics 123. New drug evaluation. Autumn. 2 pts.

2 hours to be arranged. Professor Taub.

This course carries credit only toward the M.S. degree.
The concept of new drugs and their relationship to public health. Criteria for the design and evaluation of experimental methods to determine the safety and efficacy of new drugs. Systems of quality control for the manufacture of new drugs.

Pharmaceutics 211. Homogeneous systems. 2 pts. Instructor to be announced. Given in alternate years; not given in 1967–1968; to be given in 1968–1969.
Prerequisite: *Chemistry G4091–G4092* or the equivalent.
The physical properties of homogeneous pharmaceutical systems, in terms of modern theories of solution which utilize the properties of the liquid state as their basis. The applications of thermodynamic principles to elucidate the formation and the characteristics of ideal and real solutions and factors influencing equilibria in these solutions.

Pharmaceutics 214. Interfacial phenomena. Spring. 3 pts.

3 hours lecture. Professor Weiner.

Given in alternate years; not given 1968–1969.
Prerequisite: *Chemistry G4091–G4092* or the equivalent.

A structural and theoretical consideration of interfacial phenomena; thermodynamics of surfaces, orientation at an interface, capillary pressure, Gibbs adsorption isotherm, properties of monomolecular films, with particular reference to rates of reaction and penetration; the electrical aspects of surface chemistry, including the electrical double layer, zeta potential, and electrocapillarity; the surface of solids, adsorption of gases and vapors by solids, with a discussion of the Langmuir and Brunauer, Emmett and Teller adsorption isotherms; solid-liquid interfacial free energy, contact angles, heat of immersion and adsorption from solution; structure and properties of micelles, with emphasis on theoretical consideration of solubilization.

Pharmaceutics 213. Heterogeneous systems. 3 pts. Professor Felmeister. Given in alternate years; not given in 1967–1968; to be given in 1968–1969.

Prerequisite: *Chemistry G4091–G4092* or the equivalent.

Modern views of the colloid state; preparation of colloids, nucleation, growth and coagulation, aspects of sedimentation and flocculation; electric properties of colloids, electrokinetics, origin and effect of charge, structure of double layer; stability of lyophobic and lyophilic colloids, aerosols and foams; Newtonian and non-Newtonian rheological behavior; micromeretics.

Pharmaceutics 303–304. Special problems. 1 to 3 pts.

Hours to be arranged. The staff.

Laboratory fee: $25.

PHARMACEUTICAL SCIENCES

Pharmaceutical Science 301–302. Seminar. 0 or 1 pt.

1½ hours to be arranged. The staff.

All graduate students must register for this course each term while in residence.

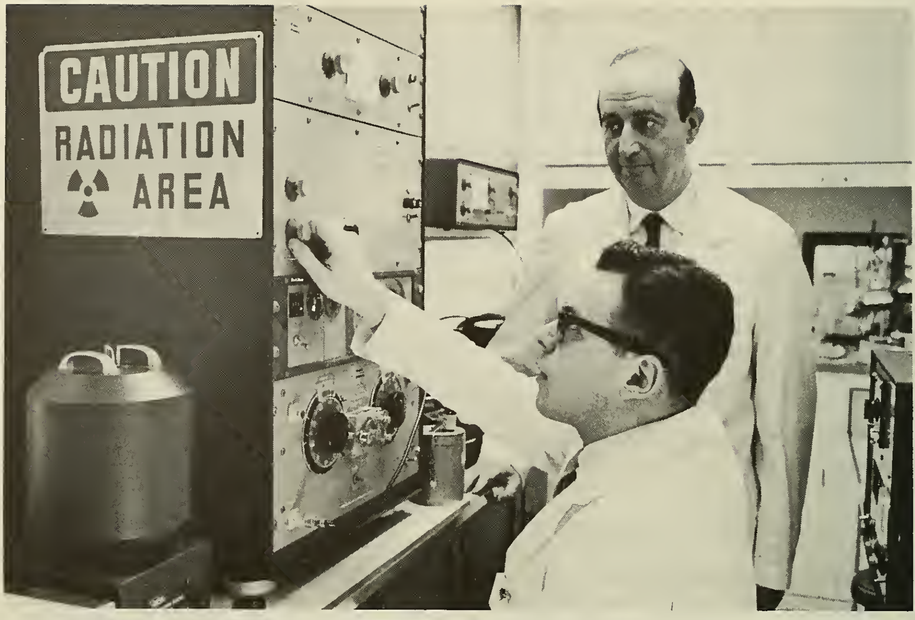
Discussion of current research in the pharmaceutical sciences.

Pharmaceutical Science 307–308. Research. Points variable.

The staff.

Laboratory fee: $25 each term. This fee will be waived for graduate students who have been certified as Ph.D. degree candidates.

Note: graduate research may also be undertaken during the summer period if the Graduate Committee has given its permission.



THE STUDY OF RADIOISOTOPES IS A PART OF MODERN PHARMACEUTICAL TRAINING

THE AEROSOL LABORATORY IS USED IN TEACHING AND RESEARCH

Evening Courses

The requirements for admission to these courses are listed under the prerequisites for each course.

The tuition is $150 a course each term; the registration fee is $5 each term.

Inquiries concerning evening courses should be directed to the Registrar, Evening Division, College of Pharmaceutical Sciences, Columbia University, 115 West 68th Street, New York, N. Y. 10023.

Application for admission, and registration, may be completed by mail.

Applied Science e115–e116. Physical cosmetic chemistry. 3 pts.

2 hours lecture. Professor Weiner.

Prerequisite: college-level general chemistry and mathematics.
Fundamental physicochemical principles applicable to cosmetic systems. Emphasis is on the structure and state of matter, chemical kinetics as related to stability, solubility, complexation, buffering and pH, oxidation and reduction, interfacial phenomena, disperse systems (emulsions, suspensions, colloids, and semi-solids), rheology, micromeritics, and other topics basic to an understanding of cosmetic formulations.

Applied Science e117. Properties and applications of raw materials. Autumn. 3 pts.

2 hours lecture. Dr. Idson.

Prerequisite: college-level organic chemistry.
Chemistry and properties of the raw materials used in cosmetics, including oils, fats, waxes, alcohols, esters, gums, surface active agents, dispersing agents, clays, antioxidants, and preservatives.

Applied Science e118. Biological cosmetic science. Spring. 3 pts.

2 hours lecture. Professor Felmeister.

Prerequisite: college-level general chemistry, biology, and mathematics.
Physiology and morphology of the skin, hair, nails, and teeth; percutaneous absorption; aspects of microbiology; antibacterial and antifungal agents, their use and evaluation in cosmetic products; toxicology and pharmacology of selected compounds and products.

Applied Science e215–e216. Cosmetic formulation and technology. 3 pts.

1 hour lecture and 3 hours laboratory. Dr. Heinrich.

Laboratory fee: $40 each term.
Prerequisite: *Applied Science e115, e116,* and *e117,* or their equivalent.
The physical and functional evaluation and the principles underlying the formulation and technology of modern cosmetic products, including creams, lotions, lipsticks, rouges, eye make-up, nail products, oral hygiene products, skin tonics, antiperspirants, talcums, face powders, hair dressings and conditioners, shampoos, permanent waving products, shaving products, and aerosols. Laboratory exercises apply the principles learned in the lectures.

Applied Science e217–e218. Unit operations in manufacturing. 3 pts.

2 hours lecture. Instructor to be announced.

Prerequisite: general chemistry and mathematics.
The theoretical and practical aspects of fine powder technology, including particle size reduction, analysis, and blending; fluid flow and liquid agitation with relation to formulation and manufacturing processes; heat and mass transfer associated with drying operations; batch drying, spray drying, freeze drying, and fluidization techniques; methods for the estimation of product stability; and a review of material balances and rate concepts.

Applied Science e317. Odorant chemistry and perfumery. **Autumn. 3 pts.**

2 hours lecture. Dr. Bedoukian.

Prerequisite: college-level organic chemistry.

Chemistry of natural and synthetic raw materials of perfumery; blending, evaluation, and selections of perfumes.

Industrial Administration e131. Research planning and coordination. **Autumn. 3 pts.**

2 hours lecture and workshop. Mr. Kuemmerle.

Prerequisite: the instructor's permission.

The required steps in the development of a new product from the new product idea through its introduction on the market; organizational structures and their effects on research and development activities; interrelationships of various departments in fulfilling their specific responsibilities; lines of communication.

Industrial Administration e133. Research and development: marketing concepts.

2 hours lecture. Mr. Jacobson. **Autumn. 3 pts.**

Prerequisite: the instructor's permission.

Definition of marketing and its relationship to product manager concept and management of research laboratories. Discussion of product positioning; sales objectives; methods of distribution; market research; test marketing; role of the advertising agency; usefulness of various marketing tools.

Industrial Administration e135. The food, drug, and cosmetic laws. **Autumn. 3 pts.**

2 hours lecture. Mr. Flink.

Prerequisite: the instructor's permission.

Organization of the Food and Drug Administration; structure of the Federal Food, Drug, and Cosmetic Act; basic definitions; prohibited acts and penalties; adulteration and misbranding of current products and devices, new drugs, depressant and stimulant drugs, cosmetics, and so forth; factory inspections and general enforcement provisions.

Industrial Administration e136. Protection of intellectual and industrial property.

2 hours lecture. Mr. Pearlman. **Spring. 3 pts.**

Prerequisite: the instructor's permission.

The basic elements of patents, trademarks, copyrights, and other related legal matters of interest to personnel in the pharmaceutical, chemical, and cosmetic industries and to those in allied fields such as hospital administration and medical advertising.

Pharmaceutical Science e107–e108. Industrial pharmaceutical manufacturing. **3 pts.**

1 hour lecture and 2 hours laboratory. Professor Kanig and assistant.

Laboratory fee: $40 each term.

Prerequisite: the instructor's permission.

The theory underlying modern methods of dosage-form production and the evaluation of physical and physiological performance is covered in discussions of compressed tablets, pan and compression coatings, sustained release medicaments, emulsions, suspensions, ointments, and other dosage forms. Laboratory exercises utilizing industrial equipment and processes are integrated with the lectures.

Pharmaceutical Science e123. Quality control. **Autumn. 3 pts.**

2 hours lecture. Mr. Grenfell.

Prerequisite: college-level quantitative analysis.

Good manufacturing practices; methods by which purity, uniformity, identity, and potency of drug and cosmetic materials and products are maintained. Emphasis is placed on the function and methods of quality control from the raw materials through the finished packaged product. Included are inspection and analysis of raw material, intermediate and finished product; packaging material and shelf-life testing; filling control and on-the-market control. Application of statistical methods to control procedures are considered.

Pharmaceutical Science e124. Instrumental and analytic methods. **Spring. 3 pts.**

2 hours lecture. Professor Farhi.

Prerequisite: college-level quantitative analysis.

Advanced methods in physicochemical analysis, including electrometric, opticometric, and chromatographic analysis; application to stability testing, quality control, and manufacturing procedures.

Pharmaceutical Science e220. Packaging. **Spring. 3 pts.**

2 hours lecture. Instructor to be announced.

Prerequisite: the instructor's permission.

The function, selection, testing, and assessment of packaging for cosmetic products. Materials and types of packaging currently used by the cosmetic industry.

Pharmaceutical Science e311. Modern microscopy and photomicrography. **Autumn. 3 pts.**

2 hours lecture and demonstration. Mr. Facq.

Prerequisite: the instructor's permission.

Basic principles of transmitted light microscopy with the emphasis on correct use of illuminators, condensors, objectives, and eyepieces; consideration given to alignment, aperture matching, magnification, and resolving power; photomicrography by transmitted light; techniques in metal shadowing and stereo photomicrography.

Pharmaceutical Science e312. Advanced techniques in microscopy. **Spring. 3 pts.**

2 hours lecture and demonstration. Miss Jones and guest speakers.

Prerequisite: *Pharmaceutical Science e311* or the equivalent.

Advanced methods and techniques in microscopy, including the theory of polarized light and the use of the polarizing microscopy; techniques for reflected light; metallurgy; phase, fluorescence and interference microscopy; microspectrophotometry.

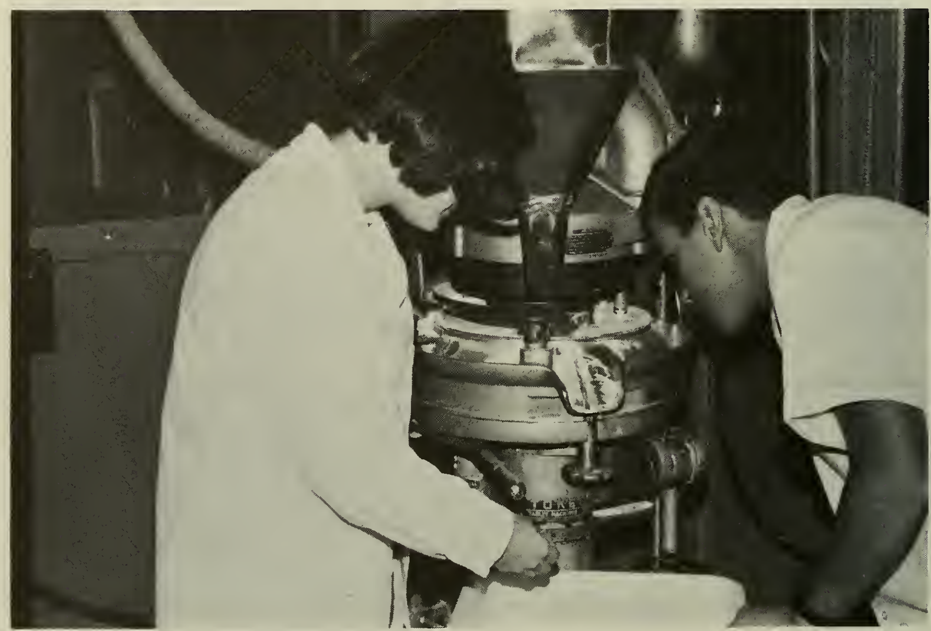
Pharmaceutical Science e318. Flavors chemistry and applications. **Spring. 3 pts.**

2 hours lecture. Mr. Schinnagel.

Prerequisite: general chemistry.

The physiology of taste and flavor; production, composition, and use of natural and imitation flavors; formulation, selection, testing, and analysis of flavors; legal aspects of flavors.

STUDENTS EVALUATE REACTION OF ANIMAL TISSUES TO EXPERIMENTAL DRUGS



STUDENTS LEARN TO OPERATE A TABLET PRESS

Registration and Expenses

▶ REGISTRATION

During the registration period at the beginning of each term, each student must register in person for the courses he proposes to take during that term. Before registration, each student receives a notice specifying when and where he is to report.

All students are asked to give social security numbers when registering in the University. Those who do not now have a number should obtain one from their local social security office well in advance of registration.

Late registration is permitted only upon the payment of an additional fee of $25 and if satisfactory cause for the delay can be shown.

A veteran who expects to have his expenses defrayed under Veterans Administration regulations must present his certificate of eligibility at the time of registration.

▶ FEES

The registration fee, the breakage deposit, the laboratory fee, the student activities fee, and the laboratory coat fee are payable each term as part of registration. Tuition may be paid in either of two ways: (1) in full at registration or (2) one half at registration and the other half at the midterm date (see the Academic Calendar for dates). Advice concerning tuition payment plans available through banks may be obtained from the Office of Admissions.

The following fees are subject to change at any time at the discretion of the Trustees:

Registration fee for each term	$ 10.00
Tuition for either degree program, each term	650.00
(A program of less than 12 points in the College of Pharmaceutical Sciences is charged for at the rate of $55 a point. Courses taken in other departments of the University will be charged for at the prevailing rates.)	
Breakage deposit for each term (refundable less charges for replacement, materials, and depreciation)	25.00
Laboratory fee for each term	30.00
Application fee for a degree	20.00
Student activities fee (B.S. program only), each term	14.00
Locker fee (first registration only)	2.00
Medical fee (University dormitory residents only)	10.00
Privileges	
Registration after dates set in the Academic Calendar	25.00
Transcripts of record	1.00

Chemistry laboratory gown purchase (freshmen)	7.00
Laboratory coat rental, each term (when required)	7.00
Laboratory gown rental, each term (when required)	9.00

ADJUSTMENT OF FEES

There is no refund of any part of the commitment fee, the registration fee, the late-registration fee, the laboratory fee, the locker fee, or the application fee for a degree. The student activities fee is not refunded when a student withdraws after the last date for change of program. The laboratory gown rental charge is not returnable. Tuition will be returned only up to and including the last day for change of program, as announced in the Academic Calendar. After this date, no refund of tuition will be authorized for withdrawal from individual courses.

In instances of total withdrawal from the College, the Registrar *may* authorize a partial refund of tuition. Any adjustment of tuition is reckoned from the day on which the Registrar receives the student's written notice of withdrawal. After the second Friday of each term, 10 percent of the tuition is retained for each week, or part of a week, of the term up to the date on which the student officially withdraws. Consequently, when the student withdraws on or before the second Friday of either term, the tuition he has paid will be refunded in full—less the $50 commitment fee which has been applied to tuition.

Any authorized adjustment of the breakage deposit is made each June, at the end of the school year.

BOOKS AND SUPPLIES

It is estimated that $500 will cover the cost of the textbooks and necessary apparatus required for the program leading to the B.S. degree.

► STUDENT EMPLOYMENT

Students seeking employment in pharmacy should consult the bulletin board in the main lobby. Upperclassmen and graduate students seeking summertime industrial employment should consult the Assistant to the Dean.

► STUDENT LOAN FUNDS

A number of sources are available for loans to deserving students who have reached sophomore or higher status. Those of particular interest are the Alumni Association Scholarship Aid Fund, the Women's Auxiliary of the Pharmaceutical Society of the State of New York, the John W. Dargavel Foundation, the Women's Auxiliary of the American Pharmaceutical Association, the New York Higher Education Assistance Corporation, and the National Defense Student Loan program. The College participates in any special student aid programs sponsored by the federal or state governments. Tuition payment plans are also available through many New York City banks.

Complete details may be obtained from the Manager, Business and Finance, College of Pharmaceutical Sciences, Columbia University, 115 West 68th Street, New York, N.Y. 10023.

► HOUSING

Approved residence accommodations are available for undergraduate and graduate students who are required by circumstances to live away from home. For information regarding housing facilities, the student should write to the Associate Dean for Student Affairs.

Student Life

► STUDENT ORGANIZATIONS

These organizations are under the general direction of the Committee on Student Activities, which consists of members appointed from the faculty and teaching staff.

Students of the College of Pharmaceutical Sciences must be in good scholastic standing to be eligible to participate in competition (athletic and nonathletic), organizations, performances, publications, and other cocurricular activities. Exceptions may be made only with the permission of the Associate Dean for Student Affairs.

THE STUDENT COUNCIL AND THE STUDENT CHAPTER OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

The Student Council in the College of Pharmaceutical Sciences consists of elected representatives from the different classes. It cooperates with and is responsible to the Committee on Student Activities in the supervision of student interests and activities.

The Student Chapter of the American Pharmaceutical Association at Columbia, to which all undergraduates belong, brings to the attention of students the professional activities, the advances, and the problems of the American pharmacist. Guest lecturers of prominence, professional displays, contests, and other programs are conducted by the A.Ph.A. Student Chapter. Membership fees include subscriptions to either or both of the monthly journals published by the parent organization. The Chapter also is active in the affairs of the International Pharmaceutical Students Federation, participating in the exchange program and having representation in the annual convention.

The Columbia University Student Council, composed of elected representatives from the students of the schools and faculties of the University, represents the students in matters affecting the student body as a whole, with the object of promoting understanding and cooperation among the students, faculty, and administration.

FRATERNITIES AND SORORITIES

The following fraternities maintain active chapters at the College: Kappa Psi, Rho Pi Phi, Delta Sigma Theta, and Alpha Zeta Omega. One sorority, Lambda Kappa Sigma, is active in the College.

► STUDENT COUNSELING

There are two groups of student counselors, both responsible to the Associate Dean for Student Affairs.

The class advisers are responsible for counseling the class as a whole with respect to class activities and faculty regulations; one faculty member is assigned to each class. The faculty advisers are faculty members to whom students are assigned for counseling in matters either academic or personal.

In addition, the Chaplain of the University, the three counselors—Protestant, Roman Catholic, and Jewish—and the advisers to the other religious groups are available for consultation in their offices in Earl Hall on the Morningside campus.

Students are invited to attend the daily services held in St. Paul's Chapel and the meetings, lectures, and activities of the various religious organizations.

► FOREIGN STUDENTS

The Office of the Foreign Student Adviser, 211 Foreign Student Center, assists foreign students with their special problems, helps coordinate all University activities relating to foreign students, and arranges social activities.

The Office handles all questions concerning the United States Immigration and Naturalization Service and requests for all types of certification to be used for immigration, foreign exchange, and other purposes.

ORIENTATION PROGRAM FOR NEW FOREIGN STUDENTS

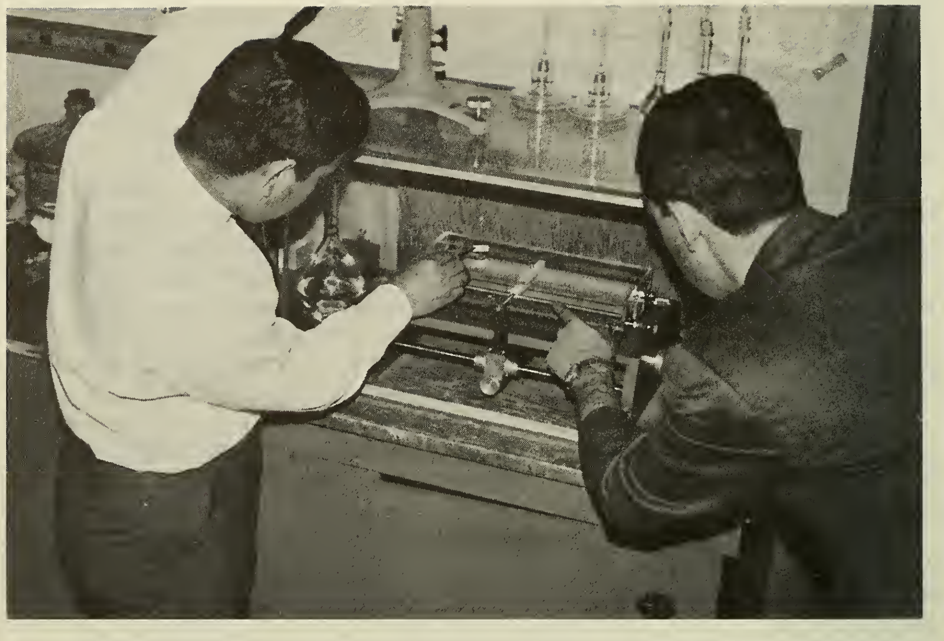
The Foreign Student Center orientation program for new foreign students is held each fall to introduce students to the Center and its services, the University, and New York City. The five-day program includes the English Placement Examination, information about registration, tours of the Morningside campus and its library, a reception to meet the President of the University, a coffee hour with the International Students Club, and an opportunity to visit an American family.

The program begins September 19 at 10 a.m. in the auditorium of Earl Hall, on the Morningside campus. At that time students receive schedules for the rest of the activities. Although foreign students are not required to attend, they are welcome to come to any part of the program which is of interest to them.

► LIBRARIES

The libraries of the University, which are available to all students, contain nearly three million volumes, exclusive of unbound pamphlets. The main collection is housed in the Nicholas Murray Butler Library on 114th Street near Broadway. The various departments of instruction have special libraries to serve their needs. The Chemistry Library in Chandler Laboratories, the Physics Library in Pupin Physics Laboratories, the natural science libraries (geology, psychology, zoology, and botany) in Schermerhorn Hall, and the Medical Library at 168th Street and Broadway are of particular interest to students in the College of Pharmaceutical Sciences.

The library of the College of Pharmaceutical Sciences contains more than fourteen thousand volumes, including reference works on pharmacy and allied branches of science as well as an extensive series of periodicals in English and in foreign languages relating to chemistry, pharmacy, botany, and allied sciences, including all important journals of interest to pharmacists.



EVALUATION OF MONOMOLECULAR FILMS ON SPECIAL APPARATUS FOR RESEARCH

A SEMINAR ON MODERN MEDICINALS

Honors and Awards

▶ UNDERGRADUATE HONORS AND AWARDS

Students who demonstrate outstanding scholastic ability and personal attributes become eligible for nomination to the Dean's List, for election to Rho Chi Society, and for the several scholarships and prizes described on pages 41–47.

The Dean's List, prepared at the close of each term, bears the names of those students whose quality point averages are 3.4 or higher and who have no grade lower than C.

Rho Chi Society, the national pharmaceutical honor society, has as its fundamental objective the advancement of the pharmaceutical sciences through encouragement and recognition of high scholarship. Students who have achieved upper junior and senior status and whose scholarly and personal attainments have met the high standards of Rho Chi, are eligible for nomination to membership. On the same basis, the privilege may be extended to graduate students and alumni of the College of Pharmaceutical Sciences.

HONORS PROGRAM

The College of Pharmaceutical Sciences is motivated by a desire to provide instruction to students of diversified abilities. Within the framework of this obligation the College also recognizes the development of the superior student because he serves as a stimulus for other students, and in so doing contributes to the intellectual leadership of the profession of pharmacy.

The purpose of the Honors Program is to enable especially capable freshmen, and upper–class students who have shown superior scholastic achievement to participate in intensive specialized work under the guidance of members of the faculty. Those students who fulfill the program's requirements will receive special honors, which will be inscribed on their diploma upon graduation.

Thus, the Honors Program is conceived as a challenge to outstanding students to assume responsibilities equal to their abilities.

For further information, contact the Associate Dean for Student Affairs.

SCHOLARSHIPS FOR NEW STUDENTS

One half of the amount of all scholarships will be credited toward payment of tuition for the autumn term; the balance will be credited toward payment of tuition for the spring term if a satisfactory average is maintained and the need continues.

The *Elmer H. Bobst Scholarships.* Five half-tuition scholarships for entering first-year students are available through the generosity of Mr. Elmer H. Bobst, Chairman of the Board, Warner-Lambert Pharmaceutical Company. Recipients will be selected on the basis of sincerity of purpose and need of such assistance.

The *Trustee's Scholarships,* established by the Board of Trustees, provide scholarships of $300 each for a limited number of new students. Eligibility for these scholarships is based on financial need and demonstrated potential for successful scholarly attainment. These scholarships are awarded, on application, usually for a period of one academic year only.

New York State Awards. New York State offers various types of financial assistance to qualified college students who are state residents. Information may be obtained from the Office of Admissions or by writing to the Department of Education, Regents Examination and Scholarship Center, Albany, N.Y. 12201. *Regents College Scholarships* carry awards of $250 to $1,000 a year depending on need; a candidate should consult his high school guidance counselor or principal for instructions on how to apply. *Scholar Incentive Awards* have a value of $100 to $500 depending on need. Application for awards should be filed with the Regents Examination and Scholarship Center two months in advance of the beginning of the term for which the grant is to apply.

SCHOLARSHIPS FOR UPPERCLASSMEN

The general basis for the selection of scholarship recipients is character, scholastic aptitude, and need. The specific requirements are described under each scholarship.

One half of the amount of all scholarships will be credited toward payment of tuition for the autumn term; the balance will be credited toward payment of tuition for the spring term if a satisfactory average is maintained and the need remains.

The *Max Blank Memorial Scholarship,* established by his family in memory of Max Blank, Class of 1937, is awarded annually to a worthy student who has successfully completed in this College the course work of the second year. The value of this scholarship is $300, to be applied toward the tuition of the third year.

The *Alexander Block Memorial Scholarship,* founded by the employees of the Block Drug Company in memory of Alexander Block, Class of 1907, is awarded annually to a student following completion of the first year in the College of Pharmaceutical Sciences. The value of the award is about $100, the annual income of the fund, to be applied toward the tuition of the second year.

The *American Foundation for Pharmaceutical Education Scholarships,* three scholarships of $200 each, are awarded to three students entering the fourth or fifth year in need of such support.

The *John W. Dargavel Scholarship* of $200, sponsored by the John W. Dargavel Foundation of the National Association of Retail Druggists, is awarded annually to a student entering the third, fourth, or fifth year.

The *Health Professions Scholarships,* established by the Federal Health Professions Educational Assistance Amendments of 1965, are awarded annually to students entering the upper three years. The purpose of the scholarships, which may not exceed $2,500 each in any one year, is to enable talented students requiring financial assistance to undertake the course of study required to enter the pharmaceutical profession. These scholarships are available only to students who would be unable to pursue the required studies without financial assistance.

The *J. Leon Lascoff Memorial Scholarship,* founded by Dr. Frederick D. Lascoff in memory of his father, J. Leon Lascoff, Trustee, 1916–1940, and a vice president of the College, 1940–1943, is awarded annually to a student entering the fourth year, on the basis of excellence in previous courses in pharmacy laboratory. This award of $200 is to be applied toward the tuition of the fourth year.

The *Lederle Tutorial Scholarships,* established by the Lederle Laboratories, a division of American Cyanamid, Pearl River, New York, provide two scholarships of $300 each to students exhibiting a proficiency in the first term of selected freshman courses. The recipients will be required to devote approximately four hours each week to tutoring students in the second term of these freshman courses.

The *Samuel J. Moritz Scholarship,* provided through bequest and having a value of approximately $200, is awarded annually to a student enrolled in the College of Pharmaceutical Sciences.

The *I. Neustaedter Memorial Scholarship,* founded by the Lindemann Foundation, Incorporated, as a tribute to Isidore Neustaedter, for many years a distinguished teacher in the College of Pharmaceutical Sciences, is awarded annually to a student entering the fourth year. The value of the award is $300.

The *Past Presidents' Scholarship Award* of $100, offered by the Women's Auxiliary of the Pharmaceutical Society of the State of New York and applicable to the tuition of the fifth year, is awarded to the student whose academic record at the end of the fourth year shows the greatest improvement over that of the first year.

The *Henry Pfeiffer Scholarships,* established as a memorial to Henry Pfeiffer by the trustees of his estate, provide scholarships of $200 each for three worthy second-year students. The scholarships are awarded on the basis of financial need, scholarly ability, and the personal qualifications of the applicant for the practice of pharmacy. They are ordinarily awarded to students for one year only, although students of promise may receive scholarship aid in subsequent years if funds are available. If the scholar fails to maintain an average of B in his studies, or if for any other reason his continued holding of a scholarship is found to be undesirable, the appointment may be terminated at the end of a term.

The *Trustees' Scholarships,* established by the Board of Trustees, provide scholarships of $300 each for a limited number of students who have completed the first year either in this college or elsewhere. Eligibility for these scholarships is based on financial need and demonstrated potential for successful scholarly attainment.

The *Murray Wollan Memorial Fund,* established by the family and friends in honor of Murray Wollan, Class of 1920, who distinguished himself by the high level of his long professional practice, provides assistance to worthy students for the purchase of textbooks and supplies.

PRIZES

The *Samuel Abate Award,* a bronze plaque established by the Class of 1958 in memory of their beloved classmate Samuel Abate, whose death occurred during the senior year, is awarded to the student entering the fifth year who, in the opinion of the fifth-year class, has made the greatest contribution to promoting its welfare.

The *Alpha Zeta Omega Award,* a set of reference books, is given annually by the Zeta Chapter of Alpha Zeta Omega to the fourth-year student who has achieved the greatest proficiency in the science courses of the third year.

The *Alumni Association Prizes,* provided by the Alumni Fund of the College of Pharmaceutical Sciences, consist of a gold, a silver, and a bronze medal to be presented at Commencement to the three members of the graduating class who have placed respectively first, second, and third in all subjects taught during the fifth year.

The *Apothekan Award* of $50, conceived by the Apothekan Staff of 1960 and supported by succeeding staffs, is given annually to the student completing his fourth year whose interest in student publications has contributed most to the welfare of his class.

The *Max J. Breitenbach Prize* of $100 is offered annually by the Trustees of the College of Pharmaceutical Sciences, in memory of Max J. Breitenbach, for many years a devoted trustee, and is awarded for the highest proficiency in the fifth year.

The *Bristol Award,* a copy of the Modern Drug Encyclopedia, is offered annually by Bristol Laboratories, Incorporated, to a fifth-year student who has made a substantial contribution in advancing the interests of his class.

The *Class of 1922 Samuel B. Reiman Award,* consisting of the latest edition of the United States Dispensatory suitably embossed on the cover, is presented to the president of the graduating class in memory of Samuel B. Reiman, president of the Class of 1922, who died in January 1947.

The *Dean's Award,* provided by Johnson and Johnson, is awarded annually to the student who performs outstandingly in the area of pharmacy administration. The award consists of a hand-turned replica of a Revolutionary War mortar and pestle. The recipient is eligible to compete for a $1,000 scholarship for graduate study in pharmacy administration or business management.

The *Diekman Prize,* founded in 1930 by the Dante Circle in honor of the late Dr. George C. Diekman, consists of a gold charm and is awarded to that student who has maintained the highest average in courses in the pharmacy and chemistry of medicinals.

The *August A. DiSomma Award,* established by the Student Council in memory of Dr. August A. DiSomma, for many years a devoted professor of chemistry, is a U.S. Savings Bond presented annually to the student who has shown the highest proficiency in the chemistry courses of the first three years.

The *Louis Dohme Prize* of $50, founded by Ernest Stauffen in memory of Louis Dohme, is awarded annually to the student who exhibits the best practical knowledge of the drugs of natural origin of the United States Pharmacopeia and National Formulary, as determined by the laboratory records and examinations in pharmacognosy.

The *Kappa Psi Award,* a gold medal, is given annually by the Gamma Chapter of Kappa Psi to the candidate for the degree of Bachelor of Science in pharmacy who maintains the highest standing throughout the course.

The *Leiterman Award,* a gold medal offered annually by Miss Lillian Leiterman (1911), is awarded to the woman graduate who has maintained the highest standing throughout the course.

The *Lilly Achievement Award,* a gold medal, is awarded to the graduate who has demonstrated superior scholastic and professional achievement, leadership qualities, as well as professional attitude. These qualities, along with academic performance, will be considered in the selection of the individual for this award.

The *McKesson & Robbins Award,* a plaque and gavel trophy, is presented annually by McKesson & Robbins, Incorporated, to the student who has served as president of the student chapter of the American Pharmaceutical Association.

The *Merck Awards,* a certificate and a set of reference books, are given to the graduate who attains the highest average in pharmacology and to the graduate who attains the highest average in dispensing pharmacy.

The *Pharmaceutical Society of the State of New York* offers a five-year membership to the graduate who, in the opinion of the class, has been foremost in promoting student welfare.

The *Olshansky Memorial Award,* a gold medal, founded by the students in attendance in 1923–1924, in memory of their beloved instructor, Jacob Calman Olshansky, whose death occurred in that academic year, is awarded annually to the graduate who has attained the highest average in pharmacy courses of the fifth year.

The *Rexall Award,* consisting of a bronze mortar and pestle trophy, is awarded to the graduate who has attained distinction in cocurricular activities as a student in the College.

The *Rho Chi Awards,* sponsored by Beta Gamma Chapter of Rho Chi Society, the national pharmaceutical honor society, consist of six reference books, one awarded to each of the three highest ranking first-year students and to the three highest ranking second-year students, in recognition of superior scholastic achievement as indicated by the quality point average at the end of the respective academic years.

The *Rosen Award,* a United States Bond of $50 at maturity, given by Max Rosen, Class of 1918, is awarded to the student who submits the best essay on pharmaceutical practice, based on his observation and experience while employed in a pharmacy.

The *George J. Seabury Award,* founded by Dr. Henry C. Lovis in memory of his uncle, George J. Seabury, for many years a member and patron of the College, is awarded annually to the student entering the fifth year who has maintained the highest standing during the preceding four years. The value of the award is about $200, the annual income of the fund, and is to be applied toward the tuition costs of the fifth year.

The *E. R. Squibb Prize* of $100, offered by E. R. Squibb and Sons in memory of Dr. E. R. Squibb, former lecturer in the College, is awarded annually to the student who exhibits the greatest proficiency in chemistry courses of the first two years.

The *Women's Club of the Columbia University College of Pharmaceutical Sciences Award* consists of two prizes of $150 each, awarded to students, one man and one woman, who have demonstrated outstanding scholarship in all courses of the first year, especially in the humanities.

► GRADUATE AWARDS

Applications for the graduate fellowships must be made before April 1 on forms issued by the Office of the Dean.

GRADUATE FELLOWSHIPS

The *American Foundation for Pharmaceutical Education Fellowships* for graduate study are awarded annually. The grants cover tuition and include an amount for living expenses. Further information is available from the American Foundation for Pharmaceutical Education, 777 Fourteenth Street, N.W., Washington, D.C. 20005.

The *Bigelow Fellowship* for research in pharmacy, established through the bequest of Clarence O. Bigelow, treasurer of the College from 1897 to 1937, is awarded annually to a student who holds the bachelor's degree from the Columbia University College of Pharmaceutical Sciences or from another accredited college of pharmacy. The incumbent will undertake graduate studies in the College of Pharmaceutical Sciences and will participate in the teaching program. The value of the fellowship is $1,800. Tuition will be remitted during the period covered by the fellowship.

The *International Flavors and Fragrances Graduate Teaching Fellowship,* providing a stipend of $2,000 and remission of tuition, is awarded annually to a superior graduate student whose interests are in chemistry or the scientific aspects of cosmetics.

The *Isaac Plaut Fellowships* for the encouragement of graduate study and original research, founded by Albert Plaut in memory of his father, Isaac Plaut, are awarded annually to candidates for the Columbia University degree of Bachelor of Science in pharmacy who have shown scholarly ability and an aptitude for original investigation. The choice of the program and the institution for graduate study are subject to approval by the Faculty of Pharmaceutical Sciences.

The *Harry Taub Memorial Fellowship,* established by Mr. and Mrs. Richard Taub in memory of their son, Professor Harry Taub, for many years a member of the faculty of this College in the Department of Pharmacology, is awarded annually to a member of the senior class who is qualified to pursue graduate work at the College of Pharmaceutical Sciences. The value of the fellowship is about $500, the annual income of the fund, to be applied toward the expenses of the graduate study.

RESEARCH FELLOWSHIPS

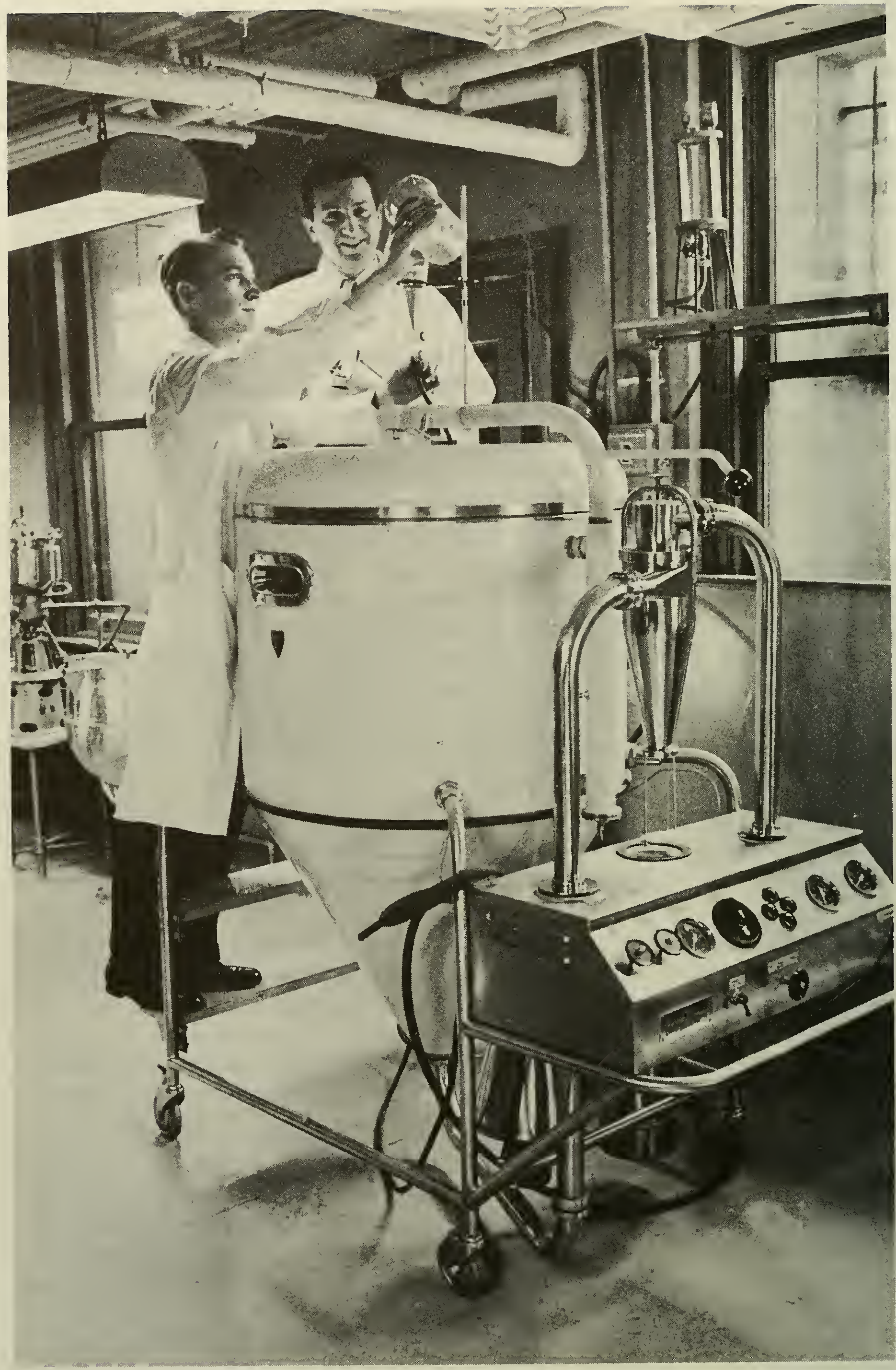
Research fellowships, provided by industrial sponsors, are available for the support of graduate student research. As a rule these fellowships are awarded only to students who have completed one year in residence.

GRADUATE ASSISTANTSHIPS

Assistantships carrying an annual stipend of $2,000 to $2,600, with remission of tuition for graduate courses, are available to graduate students with superior qualifications. Assigned duties may have to do with specific courses or with research. Research assistantships and appointments above the minimum rate are not generally available to first-year graduate students.

Application should be made at the time of application for admission to graduate study and annually thereafter.

The College of Pharmaceutical Sciences reserves the right to withhold the award of any honor, scholarship, or prize if in its opinion no candidate has exhibited qualifications justifying the award or if the amount of the accumulated income in the fund is insufficient.



THE PREPARATION OF MEDICINALS BY SPRAY-DRYING

Regulations

THE DEAN

The Dean is the executive officer of the faculty. It is his duty, under the direction of the President, to enforce the rules of the faculty and of the Board of Trustees and to administer discipline in the case of their violation.

STUDENTS

Each person whose registration has been completed will be considered a student of the University during the term for which he is registered unless his connection with the University is officially severed by withdrawal or otherwise. No student registered in any school or college of the University shall at the same time be registered in any other school or college, either of Columbia University or of any other institution, without the specific authorization of the dean or director of the school or college of the University in which he is first registered.

Students whose religious duties conflict at any time with academic requirements should apply to the Associate Dean for Student Affairs for an equitable solution.

The privileges of the University are not available to any student until he has completed his registration. Since, under the University statutes, payment of fees is a part of registration, no student's registration is complete until his fees have been paid. No student is permitted to attend any University course for which he is not officially registered unless he has been granted auditing privileges. No student may register after the stated period unless he obtains the written consent of the Dean.

ACADEMIC DISCIPLINE

The continuance of each student upon the rolls of the University, the receipt by him of academic credits, his graduation, and the conferring of any degree or the granting of any certificate are strictly subject to the disciplinary powers of the University, which is free to cancel his registration at any time on any grounds which it deems advisable. The disciplinary authority of the University is vested in the President in such cases as he deems proper and, subject to the reserved powers of the President, in the dean of each faculty and the director of the work of each administrative board.

ATTENDANCE AND LENGTH OF RESIDENCE

The attendance and minimum residence requirements for the B.S. degree are stated on page 10.

The minimum residence requirement for the M.S. degree is 30 points of course work completed at Columbia University. Therefore, a student who wishes to earn both the M.S. and the Ph.D. degrees in pharmacy from Columbia University should be aware that any advanced standing awarded for graduate work completed elsewhere will not reduce the 60 points of course work required for obtaining both degrees.

Students are particularly requested to be in attendance at the beginning of the term in order to obtain full benefit from the course. No student will be admitted later than two weeks after the opening of the term.

Attendance is required of all students. Situations may occur in which it will be impossible for a student to attend class, and the regulations which follow take such circumstances into account. These regulations set forth the absolute maximum of acceptable absences. Students are advised to keep well below these maximums; those who exceed the permitted number of absences in a course will receive the grade of F for the course.

1. For the didactic (lecture and conference hours) portion of *all* courses:

(a) A student who, in the judgment of the instructor in charge, has achieved the grade of C or lower by the last session of the course before the final examination period, may not exceed *three* times the number of class (clock) hours (lectures and conferences) scheduled weekly for the courses.

(b) A student who, in the judgment of the instructor in charge, has achieved the grade of B or above by the last session of a course may not exceed *four* times the number of class (clock) hours (lecture and conference) scheduled weekly for the course.

2. For the laboratory portion of a course, a student may not be absent from more than one laboratory period. A student who has more than one absence from a laboratory period must make appropriate arrangements with the instructor in charge of the course to complete the missing assigned work or the equivalent. If no such arrangements are feasible, the student automatically receives the grade of F for the entire course.

Each student is responsible for keeping a record of the date of each absence or lateness and the reason for it. A student who has had a communicable disease must present to the Associate Dean for Student Affairs a note of approval for readmission to classes signed by the student's physician.

WITHDRAWAL

An honorable discharge will be granted to any student in good standing and not subject to discipline who may desire to withdraw from the University. No student under the age of twenty-one years shall be entitled to a discharge without the assent of his parent or guardian furnished in writing to the Registrar. Students withdrawing are required to notify the Registrar in writing immediately.

The Dean may, for a valid reason, grant a leave of absence to a student in good academic standing.

EXAMINATIONS, GRADES, AND CREDITS

All courses usually close with the written examinations held in January and May (see the Academic Calendar on page 3). Apart from these examinations, the instructors having charge of the respective courses hold tests to determine proficiency. These tests constitute a part of the student's rating for report to the Registrar.

The student's performance in a course is reported according to the following grades: A, excellent; B, good; C, fair; D, poor—minimum pass; F, failure.

The grade of F is recorded by the Registrar for every course in which a student is absent from the final examination unless specific authorization to apply for a special examination is obtained by the student from the Dean's office not later than the day of the examination.

When a grade of incomplete is reported in any course, the student must arrange to complete the work before the close of the following term to receive credit.

Re-examinations are held during the periods established by the faculty. They are open upon application filed with the Associate Dean for Student Affairs for students who have been absent for imperative reasons from a final examination. Only one re-examination is allowed in a given course. If a student fails to take the stated re-examination following the completion of the course in which he is deficient, no further opportunity is afforded, and a grade of F is recorded.

Each credit of work carried during a term is awarded a quality point value in accordance with the following scale: each credit of a grade of A is multiplied by 4; B by 3; C by 2; D by 1; F by 0. The sum of the quality points thus obtained, divided by the total number of credits carried, is the quality point average.

On the basis of the individual's quality point average, the faculty recommends advancement, probationary status, or dismissal for low scholarship in accordance with an index which has been established as a guide for such decisions. Recommendations for nomination to the Dean's List, for graduation, and for graduation with honors are based on the quality point average.

CREDIT FOR COURSES TAKEN OUTSIDE THE COLLEGE

Students who are duly registered in the College as degree candidates may not receive degree credit for courses completed at other institutions, including the several divisions of Columbia University, unless written approval for such courses is received in *advance of registration* from an appropriate officer of the College authorized by the Office of the Dean to grant such approval. Graduate students are directed to consult with the Chairman of the Graduate Committee before registration.

DIPLOMAS

Diplomas are issued in June at Commencement, in October, and in February and are granted only upon action of the faculty.

1967

JULY

S	*M*	*T*	*W*	*T*	*F*	*S*
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

AUGUST

S	*M*	*T*	*W*	*T*	*F*	*S*
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

SEPTEMBER

S	*M*	*T*	*W*	*T*	*F*	*S*
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
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OCTOBER

S	*M*	*T*	*W*	*T*	*F*	*S*
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29	30	31				

NOVEMBER

S	*M*	*T*	*W*	*T*	*F*	*S*
			1	2	3	4
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DECEMBER

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1968

JANUARY

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FEBRUARY

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31						

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28	29	30				

MAY

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JUNE

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JULY

S	*M*	*T*	*W*	*T*	*F*	*S*
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21	22	23	24	25	26	27
28	29	30	31			

AUGUST

S	*M*	*T*	*W*	*T*	*F*	*S*
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11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

SEPTEMBER

S	*M*	*T*	*W*	*T*	*F*	*S*
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
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29	30					

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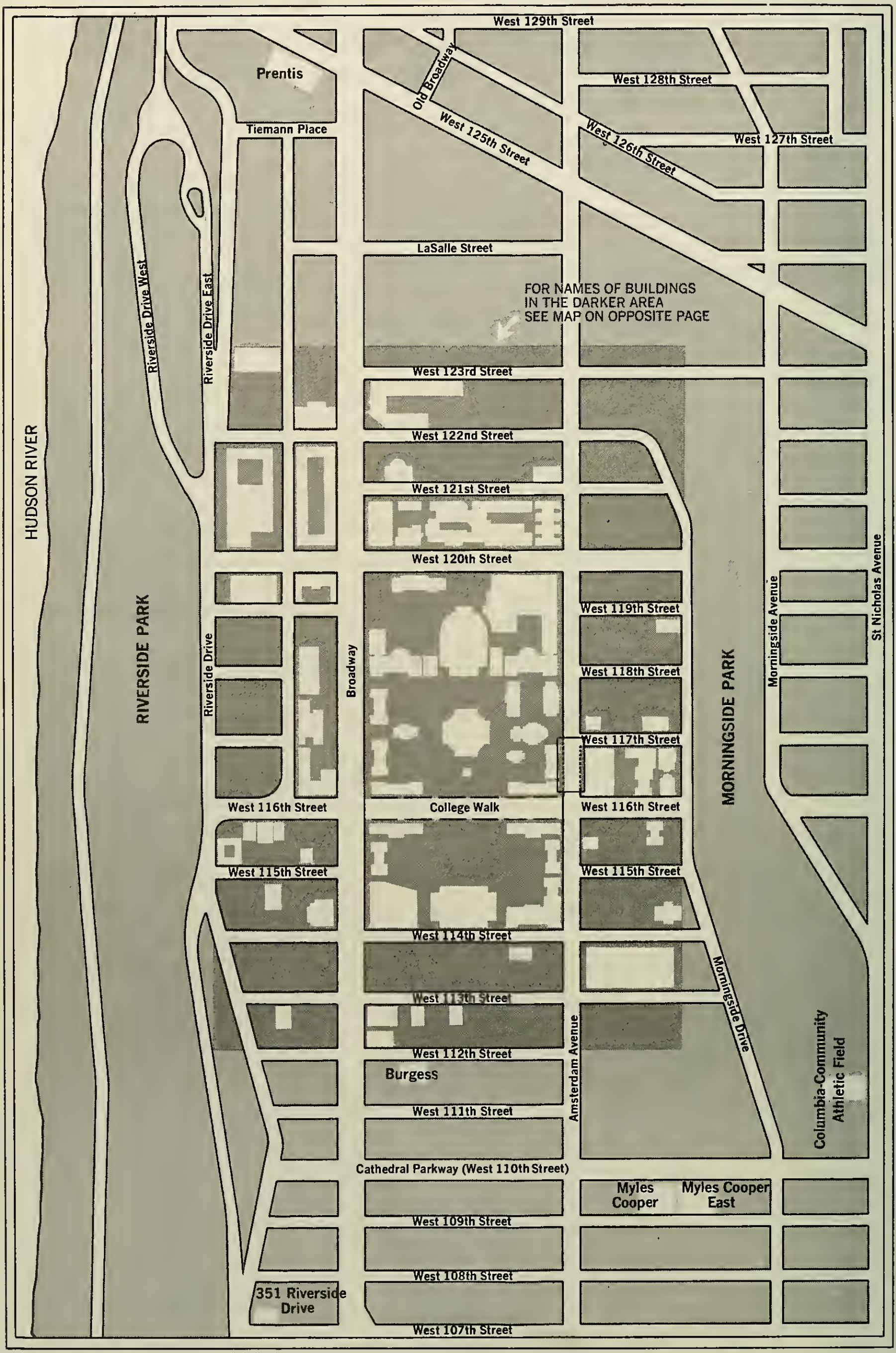

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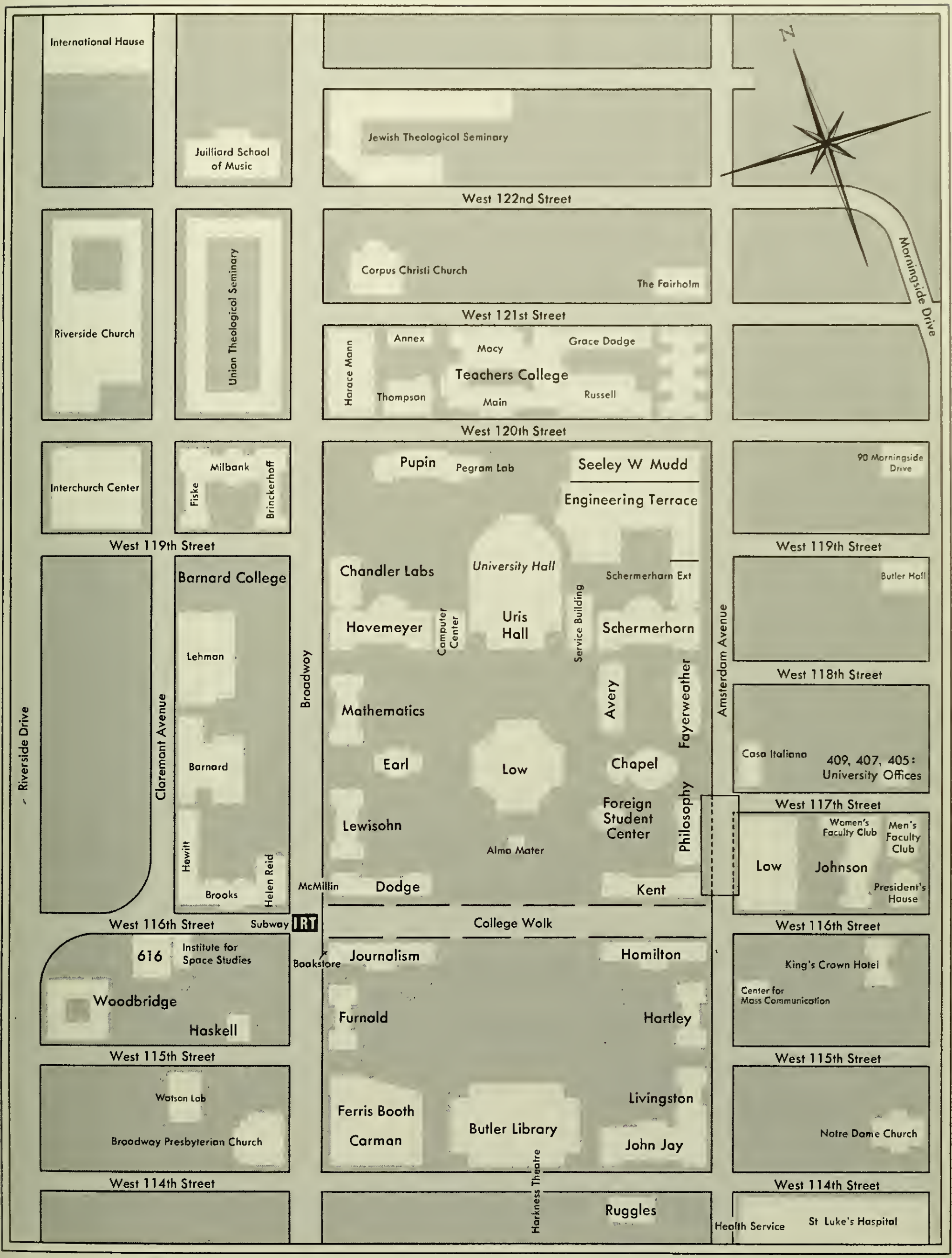

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